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JUNE 1920

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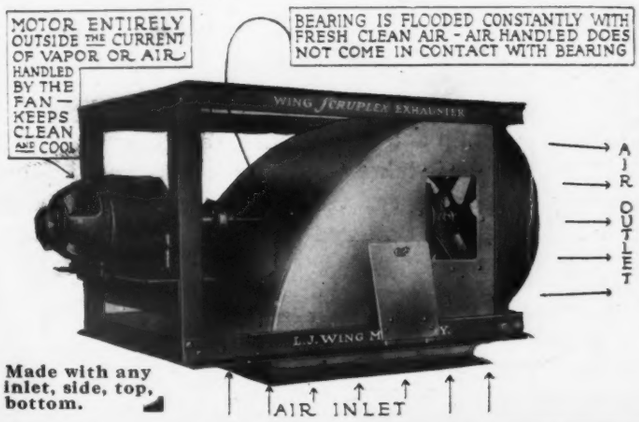
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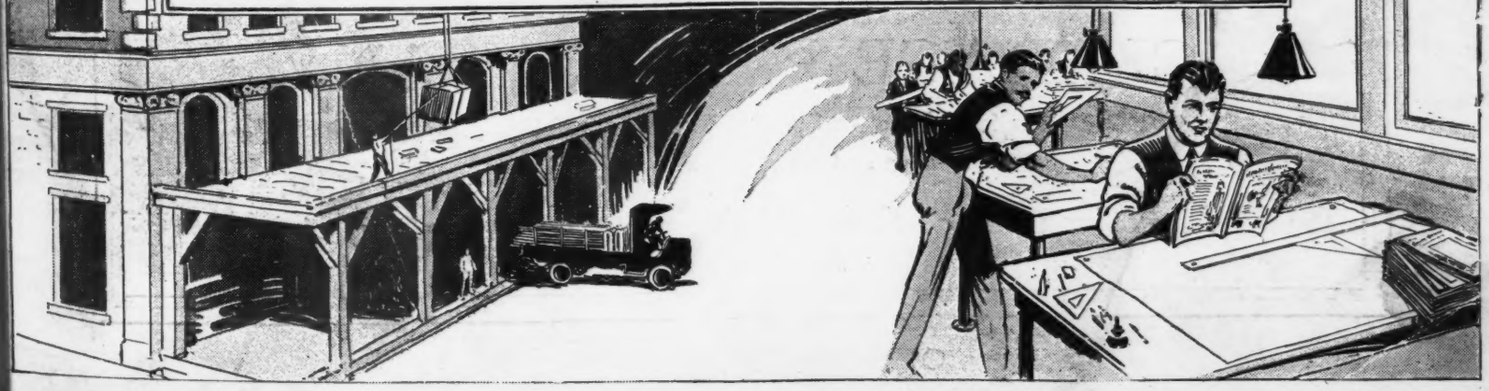

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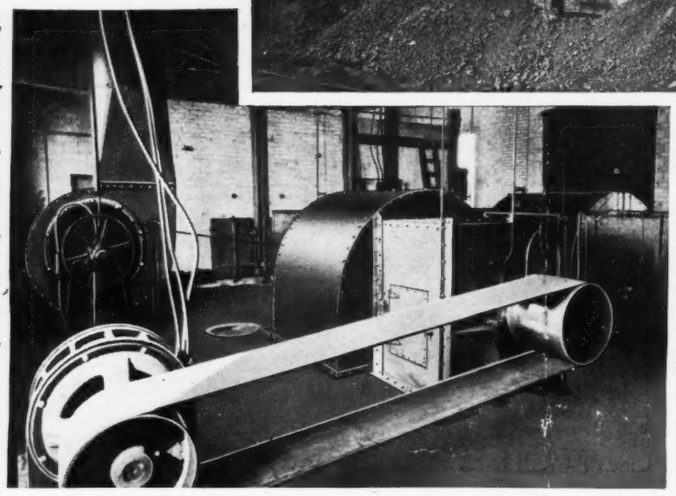
Thaw House for Frozen Coal at Youngstown Sheet & Tube Company, Youngstown, Ohio.



-AND AT YOUNGSTOWN SHEET AND TUBE CO:

Interior view showing Clarage Fan Equipment located above the coke gas furnaces.

The cost of handling frozen coal is excessive. The Youngstown Sheet and Tube Co. have proved, that where great quantities of coal are used, it *pays* to thaw out the coal before unloading from freight cars.

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FUEL OIL FOR OFFICE BUILDINGS AND POWER PLANTS GENERALLY

Latest Advices from the Pacific Coast on Methods Found Most Effective in Practice

THE WAVE of enthusiasm which swept the East over the possibilities in the use of fuel oil, as a substitute fuel for coal, has already had its reaction in the light of a calmer consideration of its disadvantages, as well as its many advantages. Such matters as the limitations in connection with its storage, the permanency of the supply, and the likelihood of increased prices following the rising cost of coal, are all points that need to be taken care of before the decision is finally made in any given case. In the meantime the lack of experience on the part of Eastern engineers in the use of fuel oil has resulted in a host of inquiries for available data on the subject.

In order to give the readers of THE HEATING AND VENTILATING MAGAZINE some first-hand information from the section where fuel oil has had probably its greatest success, the following review of the subject has been contributed by Thomas Morrin, a prominent consulting engineer of San Francisco, and senior member of the firm of Morrin & Coddington, of that city.

"In California in particular," states Mr. Morrin, "and on the Pacific Coast in general we have used crude asphaltum base oils for fuel for at least 35 years, or more. During that period much thought has been given to the efficient use of this class of fuel, particularly to the especial burners applicable to the several different combustion chambers or furnaces in which the fuel is to be used, whether for land service in its many branches, divided into power plants, forges, reduction furnaces, metal melting, heating, ventilating, culinary service in all its branches, and for every service in marine requirements.

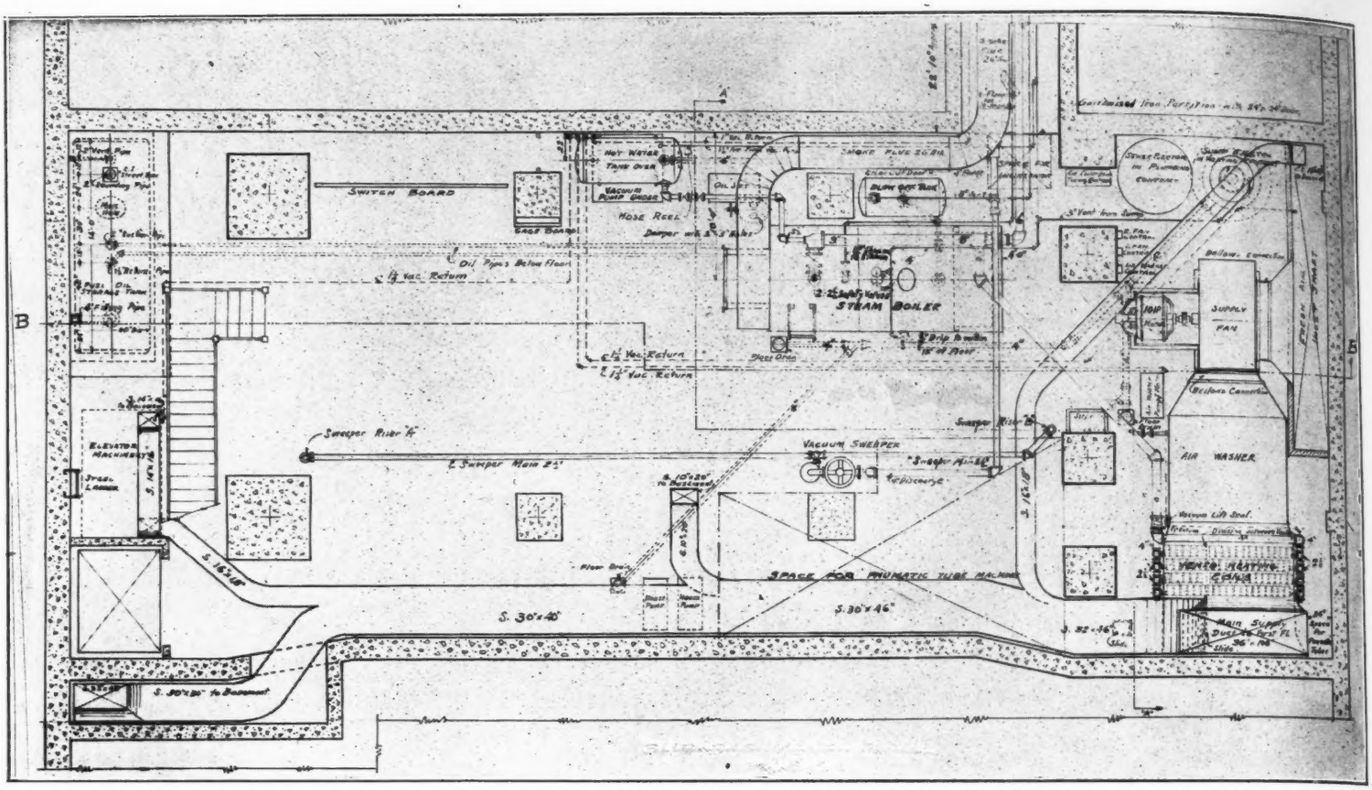
COMPRESSED AIR NOW USED FOR ATOMIZING PURPOSES.

"In all land installations, in the beginning, dry steam at high or intermediate pressures were used exclusively for atomizing the oil into minute particles at the burner tips as the most convenient and satisfactory medium for preparing the oil for combustion, as quite all the early burners were what was known as 'inside mixers,' and the quantity of steam in volume to accomplish good atomization was frequently as high as 10% of the feed-water volume of the water evaporated.

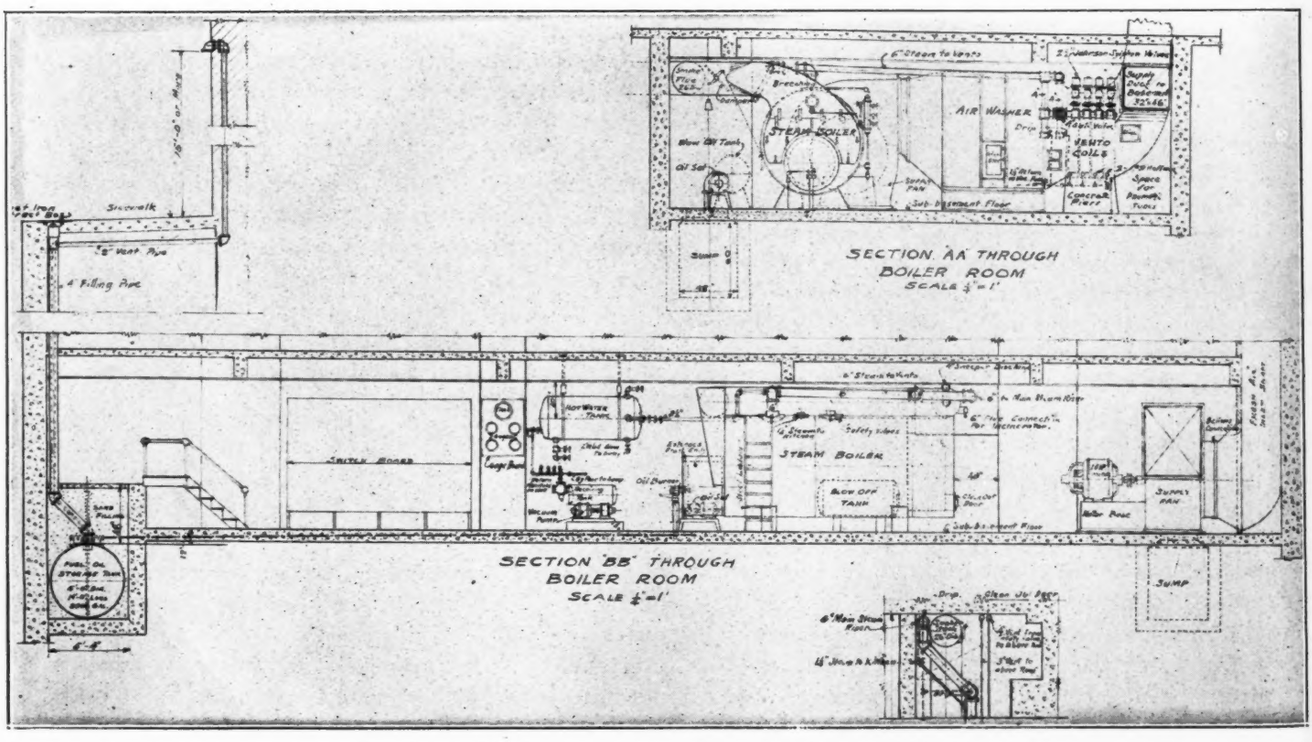
When the outside mixer type of burner was developed, the amount of steam or compressed air was very materially reduced to an efficiency entirely satisfactory. All marine and isolated low-pressure installations now use air under different pressures for atomizing purposes and cold oil, except those plants, land or marine, that have adopted a system which uses oil at high temperatures delivered to the burners at very high pressures, which method automatically atomizes the oil by high velocity into the furnaces.

USE OF LOW-PRESSURE AIR IN SMALLER INSTALLATIONS.

"When, however, fuel oil was introduced for fuel service in isolated plants, such as residences, apartment houses, small hotels, restaurants and kindred institutions, for heating, ventilation, domestic hot water and culinary purposes, low-pressure air was introduced as the atomizing medium, varying in pressures from 30 lbs. gauge to 10 in. to 14 in. of water. The latter pressures are now prevailing, and are not only very efficient but are automatic in operation over a great range of pressures and



SUB-BASEMENT PLAN, BANK OF ITALY BUILDING, SAN FRANCISCO, SHOWING OIL-BURNING EQUIPMENT.

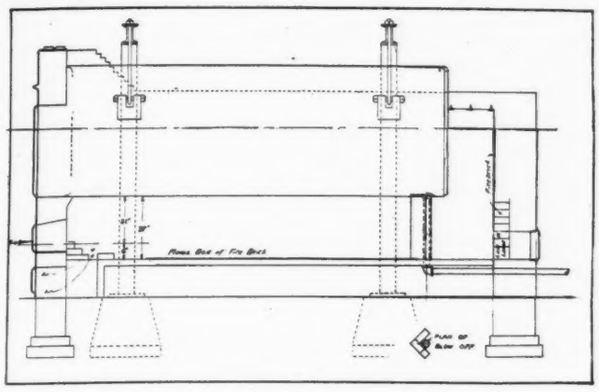


SECTIONS THROUGH BOILER ROOM, BANK OF ITALY BUILDING.

temperatures, according to the particular service required. Nearly all the most efficient burners here for low-pressure isolated work are of the turbine type that give a high centrifugal effect towards atomizing the oil sufficiently for perfect combustion. In fact, this latter system is applicable to any service, great or small.

FIRE HAZARD LOW.

"When the installation and storage of fuel oil was first introduced on the Pacific Coast, particularly for isolated plants, the National Board of



TYPICAL ARRANGEMENT OF BOILER SETTING FOR BURNING FUEL OIL.

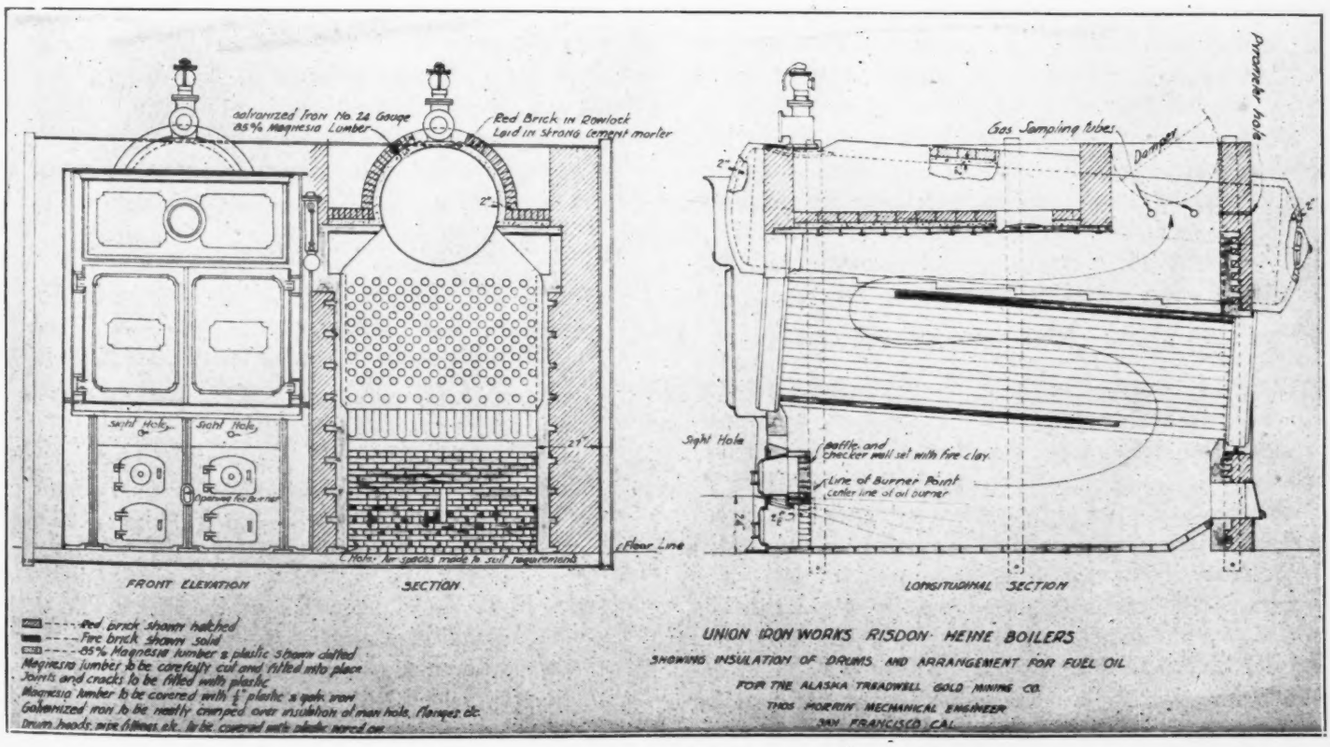
Fire Underwriters, formulated and, through the local fire marshals, put into general use a system of rules for the installation of fuel oil plants that has met with general adoption and success, as far as fire risks and general hazards of this type of fuel may be hazardous. In no case that has come under our observation has there been a serious accident or fire from the fuel oil when the rules of the fire underwriters have been observed to the letter.

"The principal requirement in an isolated fuel oil plant is to place the fuel oil storage tank sufficiently below the level of the burners so that there will be no possibility of the oil "siphoning" through the burner should the burner be extinguished from any cause while the oil supply is on. Another precaution is to use motor-driven gear pumps and an automatic thermostat controlled by the furnace temperature, which will open the electric circuit when the temperature falls a few degrees, and which prevents the flooding of the furnace with oil through the burner should the fire go out.

TYPICAL SAN FRANCISCO INSTALLATION.

"The accompanying drawings show an installation for an office building, made in strict compliance with the underwriters' rules and the local ordinances governing these installations. It will be noted that the storage tank is located 12 in. below the boiler room floor slab, and that the oil suction and relief return pipes are enveloped in the concrete floor slab. The filling pipe is sealed at the curb line with a screwed cap or plug and the whole covered with a metal box. The sounding pipe, which extends just above the tank fill, is fitted in the same manner as the filling pipe. The vent pipe is graded up from the tank to a minimum of 15 ft. above the grade line of the sidewalk and exposed to the outside, with the opening turned down to protect it from the weather.

"Additional details are included of two typical


galvanized Iron No. 24 Gauge
85% Magnesia Lumber
Red Brick in Rowlock
Laid in Strong Cement mortar
Sight Hole
Sight Hole
Opening for Burner
Floor Line
Gas Sampling Tubes
Damper
Pyrometer Hole
Sight Hole
Baffle and checker wall set with fire clay
Line of Burner Point
center line of oil burner
FRONT ELEVATION
SECTION
LONGITUDINAL SECTION
Red brick shown hatched
Fire brick shown solid
85% Magnesia lumber & plastic shown dotted
Joints and cracks to be filled with plastic
Galvanized iron to be neatly crimped over insulation at man hole, flanges etc.
UNION IRON WORKS RISDON-HEINE BOILERS
SHOWING INSULATION OF DRUMS AND ARRANGEMENT FOR FUEL OIL
FOR THE ALASKA TREADWELL GOLD MINING CO.
THOS MORRIN MECHANICAL ENGINEER
SAN FRANCISCO CAL.

DESIGN OF HEINE BOILER FOR ALASKA TREADWELL GOLD MINING COMPANY'S PLANT, SHOWING INSULATION OF DRUMS AND ARRANGEMENTS FOR BURNING FUEL OIL.

schemes for the installation and application of oil burners to two types of boilers. These will give a general idea of all applications to steam boilers of large capacity."

WHAT THE OPEN WINDOW DOES TO THE COAL BILL

Estimates of the Waste Due to Admitting Outdoor Air in Mild Weather and How Automatic Temperature Regulation will Prevent Such Waste

BUT little thought is ordinarily given to the increase in the coal bill due to the opening of windows. This is an item which may be charged to ventilation, rather than to heating, but it is more often due to wasteful practices of the tenants of a building, since if radiators are occasionally turned on or off to meet the heating requirements, but little ventilation will be required beyond that which takes place around window cracks and through walls.

Rooms should be cooled by turning off the heat rather than by opening windows,—so far as this method is consistent with suitable ventilation. However, it is doubtless more agreeable to a tenant to open a window than to bend down to operate the handwheel on a radiator valve, a practice which if successfully carried out requires considerable attention and thought.

Heating systems are designed for the maximum load which occurs when the weather outside is the coldest. In this latitude it is below zero less than 10% of the heating season. Consequently, the heating system must be run during the remainder of the heating season at less than full capacity, so that there is a tendency to overheat in the milder weather in all types of buildings.

Many an office building has been equipped by the tenants with window ventilators and other devices which increase the ventilation and therefore the heating requirements. With the high cost and scarcity of coal it seems advisable to give this matter of additional load more attention than it now receives.

FIGURES FOR A SIX-STORY APARTMENT HOUSE.

With the previous remarks in mind, the following figures have been prepared for a six-story apartment house having thirty-eight apartments. In the calculations, the assumption has been made, based on lengthy observation, that on the average, in each apartment there are two windows 23 in. wide which are raised 3 in. from the bottom for 10 hours per day. The windows will ordinarily be closed in weather below 30° F., for the simple reason that with windows open in such weather, the radiating surface will be inadequate for the conditions, and this has been taken into account in the figures. No attempt has been made to allow for unusual conditions which frequently occur and it is believed that the computations are extremely conservative.

In the usual apartment house, there are at least two 2-col. 9 section, 30-in. radiators, each of 36 sq. ft. capacity. These are ordinarily set in a corner along a wall and at right angles to the window with a sill 26 in. high, so that with the window open the cold outside air passes directly over the entire radiating surfaces. At first thought, it would seem that only one-half of the surface would be exposed to the entering air currents, but if one smokes close to an open window on the pressure side, but in ordinary still weather, he will observe the smoke dropping directly to the foot of the radiator, since the latter creates a draft in that direction.

INCREASE IN RADIATOR EFFICIENCY DUE TO AIR VELOCITY.

The velocity of the air will average about 300 ft. per minute, thus increasing the efficiency of the radiator about 55 B. T. U. In addition to this there is an increase in the standard constant 1.67, which is the B. T. U. transmitted per square foot of radiation per degree of temperature difference per hour. This increase is approximately 2% for each 10° of variation from the standard conditions of 150° temperature difference. The latter is obtained with steam at 3 lbs. pressure having a temperature of 220° and with the room heated to 70° F., making a transmission of $150 \times 1.67 = 250$ B. T. U. per square foot per hour.

CALCULATIONS BASED ON AVERAGE WINTER CONDITIONS.

From a study of the weather reports published in THE HEATING AND VENTILATING MAGAZINE, and selecting those for an average winter, it will be found that there are about 220 days in the heating season, of which 20 days are below 30° F., the remaining 200 days averaging approximately 45° F. The temperature difference will then be $220 - 45° = 175°$, which, with the constant 1.67 increased 5% as explained above to 1.75, will increase the transmission to 1.75×175 deg. $= 306$ B. T. U. This is an additional 56 B. T. U. over that of the 250 B. T. U. for standard conditions and is due to the increase in temperature difference. Adding this to the 55 B. T. U. due to greater velocity of the entering air, will give a total increase of 111 B. T. U., and this multiplied by 36 sq. ft. of radiation, equals 3996 B. T. U. per hour or 45% additional due to the opening of one window.

This amount checks closely, as it should, with the heat required to raise the volume of entering air from 45° to 70°, an amount which is (23 in. × 3 in. ÷ 144 = 0.479 sq. ft. × 300 ft. per min. × 60 min. × 25 deg. × 0.02 B. T. U. =) 4011 B. T. U.

LOSS EXPRESSED IN TERMS OF ADDITIONAL COAL BURNED.

For average boiler efficiency, each pound of coal will give 8000 B. T. U. per pound, so it will be seen that ½ lb. of coal will be required for each radiator of 36 sq. ft. capacity, because of the open window. Therefore, ½ × 2 lb. radiators × 10 hours = 10 lbs. of coal per day per apartment, and 200 days × 10 lbs. = 2000 lbs. or 1 ton per heating season. Thus, 38 tons additional are required for all the apartments, an amount which is about one-fourth of the coal ordinarily consumed in such a building when the windows are not opened. This does not check with the previous statement of 45% increase, since the returns comprise an additional 10% of heating surface and there are various other conditions which enter into the building as a whole.

LOSSES MAY BE HIGHER THAN THOSE FIGURED.

The preceding figures show conservatively the coal which is wasted annually in a building of the class selected and beyond a doubt the losses are somewhat higher, since it is impossible to figure all of the conditions and elements of waste. Windows are frequently opened wide, top and bottom, in all kinds of weather, both cold and windy, and with one window opened on the windward side and another on the lee side, the draft is considerably increased.

EFFECT OF AUTOMATIC TEMPERATURE REGULATION IN MEETING THE PROBLEM.

The lesson to be learned by recognition of such wasteful practices is obviously the adoption of some means to prevent their continuance. This is something which has long since been successfully solved by the application of various appliances which enter into the field of automatic temperature regulation. So well has this subject been covered in the "Advance Report of a Committee on Automatic Heat Control, as furnished to the Fuel Administration" that the following extracts taken from this report are presented in the words of the committee:

"All devices for automatic temperature regulation are and must be devices making for economy of fuel, since they shut off the heat supply whenever the desired temperature has been attained, turning the heat on again only when the temperature drops below the desired point."

"It is no uncommon thing, where automatic temperature regulation is not installed, to see a man devoting his entire time to the manipulation of the heating system and the windows or to the valves governing the temperatures for certain processes of manufacture."

"The cost of heating buildings supplied from an outside source, especially when steam is used, is nearly always materially reduced by installing automatic temperature regulation. With such systems of heating, the occupants control the temperature in the easiest way, which is to open the windows, and seldom turn off the heat. When the coal is burned on the premises a natural human instinct to reduce labor as much as possible tends to some extent to prevent waste."

"A fair share of all the public buildings are equipped with automatic temperature regulation, particularly those buildings having mechanical ventilation. This is done not only because fuel economy is sought, but also because, with such ventilation very rapid air changes are necessary and manual temperature control is impossible. There is a decided tendency to install automatic temperature regulation for street and railway cars, in order to take the fullest advantage of the heat given off by the occupants."

COST OF AUTOMATIC REGULATION.

"The cost of installing automatic temperature control to an existing plant varies, of course, with the conditions. In manufacturing buildings, it is often possible to control a large number of heating units in the same room with one thermostat. While perhaps not so minute regulation will thus be accomplished, a general condition will be attained of preventing overheating."

"Where the building is considerable in size and has many rooms, a system of regulation having many units—such as the type using compressed air as motive power—or an electrical system, is least expensive and most satisfactory. With its control of each unit of radiation, varying the amount of heat as the varied exposure and heat source conditions of the buildings require, such a plant must reach a high efficiency. Maintenance seems to cost annually not to exceed 2% of the cost of the plant."

"For buildings having but one or two rooms, and for residences of reasonable size, however heated, single-unit regulators, which may be self-contained, or electric or mechanical, give satisfactory results and the maintenance cost is negligible."

"It may be roughly stated that a good system of automatic temperature regulation may be installed in a building for from 5% to 10% of the cost of the heating plant."

ELIMINATION OF NOISES IN HEATING AND VENTILATING SYSTEMS

Notes on the Cause, Effect and Prevention of Mechanical Air and Water Hammer Vibrations

II

(*Continued from May issue.*)

SUPPLY runouts from the steam main to the risers or radiators should be inclined down from the radiator or riser to the main at 45° as shown in Fig. 8. This method allows the condensation to flow down along the bottom of the runout without obstructing the flow of the steam in the main as occurs when the runout is otherwise arranged (Fig. 9), with the condensation cutting through the main steam flow.

THE USE OF LOOP SEALS TO ELIMINATE WATER HAMMER.

When a return is placed above the boiler-water-line it is termed a dry return and usually contains a certain percentage of steam with the water, for which reason it must be larger in size than a wet return which is placed below the water-line, and thus may carry water only. A wet return is always preferable on a two-pipe gravity system, but the local conditions do not always permit of its use.

A poor method of dripping the end of the main in a two-pipe dry return system is shown in Fig. 10, with the drip connected directly from the steam main into the return.

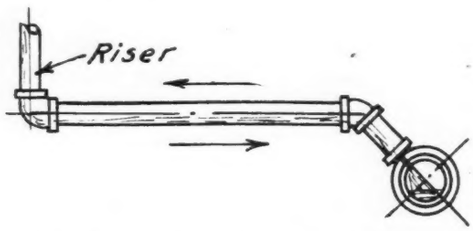


FIG. 8—PROPER ARRANGEMENT OF RADIATOR RUNOUT.

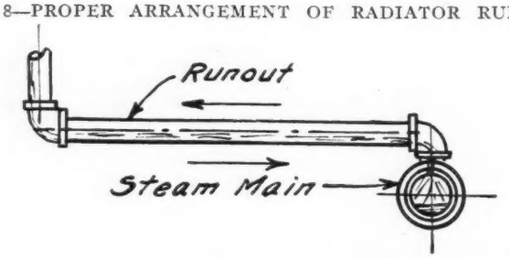


FIG. 9—THIS FORM OF RUNOUT OBSTRUCTS FLOW OF CONDENSATION.

However, better results may be secured by water-sealing the drip before its connection to the return, as shown in Fig. 11. This prevents steam from short-circuiting directly into the return without passing through a radiator, and therefore causes a slight difference in pressure to exist between the steam and return main. The flow through the radiators will also be more positive with less air binding within the radiators, since steam cannot enter from more than one direction, and force condensation back through the return into the radiator, causing water hammer.

Loop seals are an advantage when the system is started up. As steam is turned on and enters the cold mains and branches it condenses rapidly, and this first water of condensation is then quickly passed through the large areas afforded by the loops, in particular when these are made of liberal sizes. Some provision should be made for draining the seal and cleaning out. A brass plugged tee or nipple and cap may be used for this purpose. The depth of seal necessary is determined by the difference in pressure existing at that point, being about 2 ft. in depth for each pound difference in pressure.

WATER HAMMER AS CAUSED BY SHORT CIRCUITING

To the inexperienced, a heating system presents many problems. Failure of certain radiators to heat properly often appears as a mystery, since it is not always the same radiator which water logs, air binds or produces water hammer. However, the failure of any radiator to heat properly is due

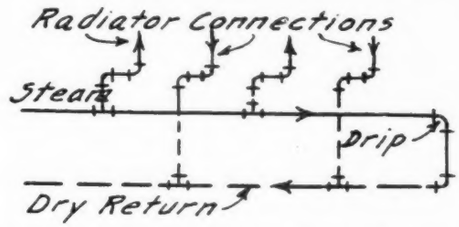


FIG. 10—POOR METHOD OF DRIPPING END OF MAIN.

to negligence of certain laws of pressure difference and piping improperly arranged.

Very often the mystery seems to be of the most complicated nature, for while certain radiators heat properly in course of time, once they have been closed off for awhile they heat up again only after a long time and with considerable difficulty. This is because such surfaces having been cooled off, condense steam very rapidly upon first entrance, and unless favored in every way by properly sized and connected pipe, difficulties ensue; in particular where the condensation must flow back in the same pipe against the flow of steam.

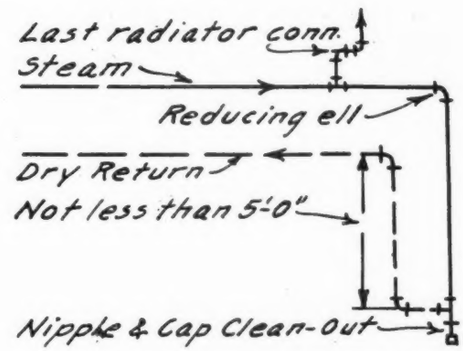


FIG. 11—WATER-SEALING THE DRIP BEFORE CONNECTING END OF MAIN TO RETURN.

This is particularly noticeable where the pipes are undersize or where in old plants, radiation with long horizontal pipes in round-about ways, has been added from time to time without an increase in the size of piping. Under these conditions, the first radiating surfaces are best, and sometimes the only ones served. A radiator that will heat today, may

not tomorrow, being mainly dependent for its action upon the opening or closing of certain other radiators.

Back-firing or short-circuiting and the method of turning on or off of valves is frequently the cause of these troubles. In starting up a cold system or one in intermittent operation, it is desirable that the steam displace the air in the pipes in a quiet and continuous manner. At the same time steam should be kept from entering the return end of the radiators, otherwise it will come in contact with the air valve on this end and close it long before the air has been driven out of the radiator. Such radiators will be hot at both ends and cold in the middle sections where they are air-bound.

WATER-HAMMER IN RADIATORS.

The hand valve on the return end of a radiator in a two-pipe gravity steam heating system should first be opened or closed when operating the radiator. If the supply valve is

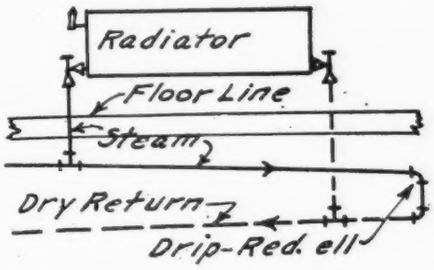


FIG. 12—RADIATOR CONNECTIONS MADE WITHOUT A LOOP.

first closed, the steam remaining in the radiator will condense and create a vacuum tending to draw water from the return, and when the supply valve is again opened, water hammer will result. If the ordinary steam valve on the return end is replaced by a check valve, there is less liability of water hammer in the radiator because of condensation being forced back. Care must be taken to provide for a vertical head of water above the check so as to insure the lifting of the flap without holding back the water in the radiator. If the radiator is close to the floor, the valve may be placed on the ceiling below, but this may be avoided by using an angle Impulse check valve.

With radiator connections made without a loop as shown in Fig. 12, the steam will pass down into the return and then up into the nearest return connection, causing adjacent radiators to feed from the return end. This is due to the steam travelling around such a drip connection in less time than it takes to blow the air out of the other

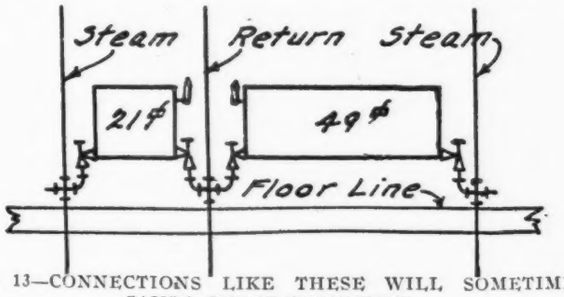


FIG. 13—CONNECTIONS LIKE THESE WILL SOMETIMES CAUSE SHORT-CIRCUITING.

radiators. Another factor entering into the situation is that some radiators are of less capacity than others. For instance, it takes less time to blow the air out of a small wall radiator than it takes to expel it from a 50 sq. ft. radiator, and this may contribute to short circuiting. Difference in radiator capacity sometimes causes back-firing even with radiators connected to risers, as shown in Fig. 13.

Where several radiators are connected on a two-pipe job, the steam at a higher temperature may enter the return from a radiator doing but little heating, and slow up the next radiator which has a greater capacity. A check valve has its uses, but it will not prevent water-logging unless the head of water from the more heavily loaded radiator is greater than the difference in pressure each side of the check.

WRONG AND RIGHT METHODS OF PIPING RADIATORS.

Figs. 14 and 15 show the wrong and right methods of piping to radiators so that short circuiting will be avoided.

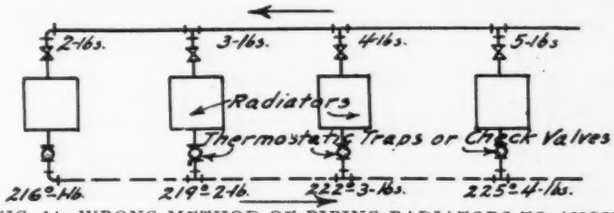


FIG. 14—WRONG METHOD OF PIPING RADIATORS TO AVOID SHORT-CIRCUITING.

In Fig. 15 the distance from each radiator to the boiler is balanced so that whatever the drop on the line may be, the relation to the return and the drop through the radiator will be the same. In Fig. 14, the water in the return must flow from a lighter and against a heavier pressure.

Pressure decreases in accordance with the distance from its source and the friction surface encountered, steam tending to flow through the line of least resistance, which is usually the shortest distance. This principle is illustrated by an actual layout of ceiling coils shown by correct method in Fig. 16 and wrong method in Fig. 17. If the connections were made as shown in the latter, steam would flow through its first connection back to the return and, being at higher pressure, would retard the supply to and the return from all other coils beyond that point, thereby causing surging or water-hammer.

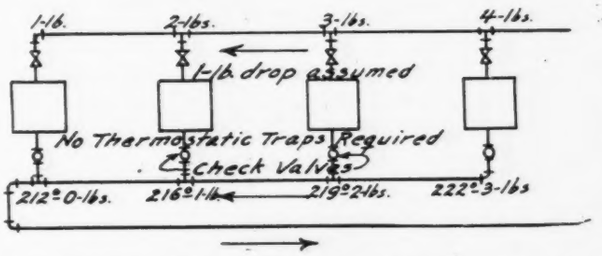


FIG. 15—PROPER METHOD OF PIPING RADIATORS TO AVOID SHORT-CIRCUITING.

In Fig. 16, the flow in the supply and return mains are both in the same direction, as shown by the arrows. For example, coil F is supplied and its branch return connected to the main return, then coil E is supplied and its return connected to the main in the order given, and so on until the last coil is served. In Fig. 17, the flow in the two mains is in opposite directions.

A pipe coil should always be supplied through the end of a header on the longest side of the coil, the return being connected on the same side to the other header, since with this method less short-circuiting of the steam through the pipes of the coil is secured than would otherwise be obtained. If the steam passes directly through the shortest pipes, it will reach the air valve and close it before the air is expelled from the longer pipes and thus the coil becomes air-bound. Supply branches to ceiling pipe coils should be connected from the top of the steam main to prevent condensation from entering the coils. It is also advisable to pitch each coil downward in the direction of its return end, so that the pipe forming the outer and longer side of the coil will be at the lowest point at that end. This, aided by the

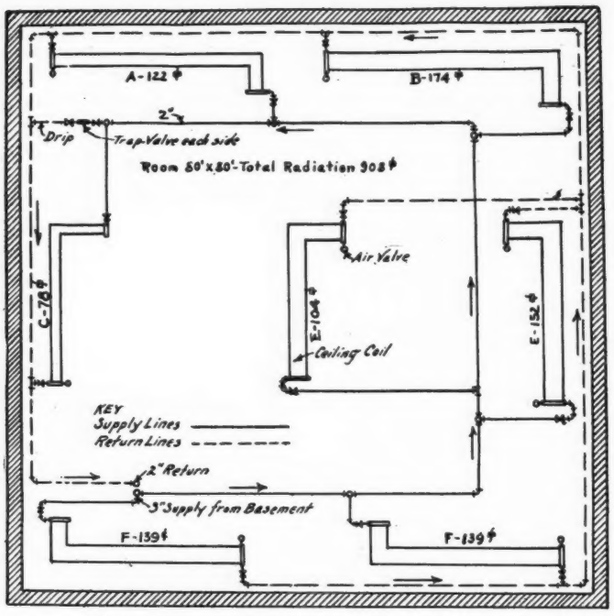


FIG. 16—CORRECT METHOD OF CONNECTING CEILING COILS.

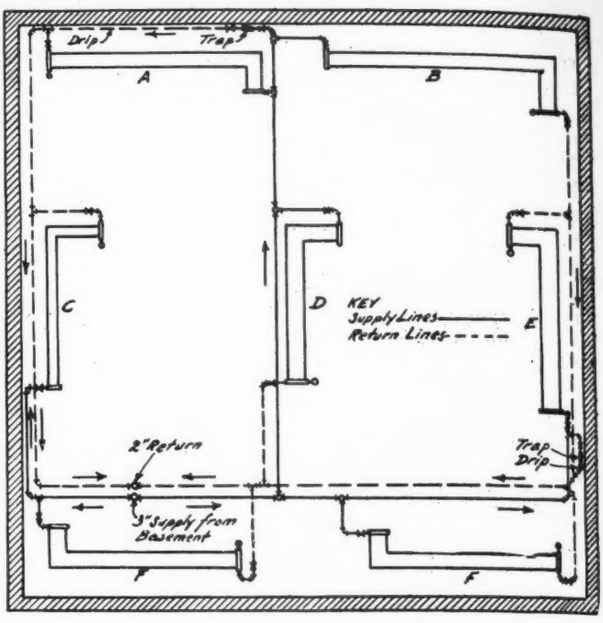


FIG. 17—INCORRECT METHOD OF CONNECTING CEILING COILS WHICH WILL CAUSE SURGING AND WATER-HAMMER.

use of an eccentric fitting, or reducing ell connected into the return header, allows for the complete drainage of the coil.

Another source of mystery is that caused by air binding in the main return. Knocking in pipes, spurting of water from radiator air valves, unsteady water-line and sudden return of condensation to the boiler are often caused by failure to relieve air from the dry return at the point where it drops to the water seal. Air will collect at this point since it cannot return against the steam and condensate, nor can it be forced downward through the water seal. It is caught between the two and must be relieved, either by an air valve, as shown in Fig. 18, or by a radiator which being nearby, may be connected at this point.

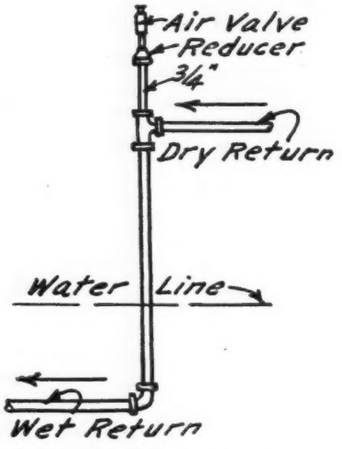


FIG. 18—AIR VALVE TO RELIEVE MAIN RETURN.

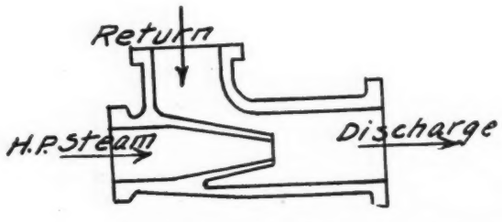


FIG. 19—TYPE OF EJECTOR TO REMEDY DEFECTIVE CIRCULATION.

THE USE OF SUCTION TEES AND Y FITTINGS TO REMEDY DEFECTIVE CIRCULATION.

In old and extended systems in which the circulation is defective, good results may be obtained by connecting a steam ejector into the return, as shown in Figs. 19 and 20. The ejector may be installed in the particular portion of the system which is to be remedied and operated only once or twice a day.

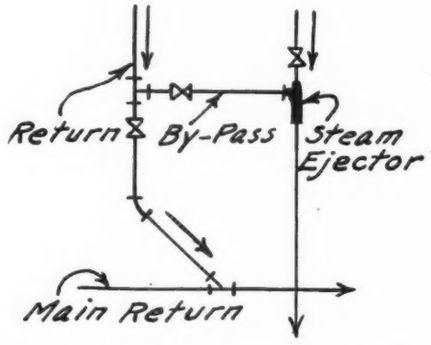


FIG. 20—TYPICAL INSTALLATION OF EJECTOR TO AID CIRCULATION.

For the connection of branch return pipes and branches to mains in dry return systems, the use of Y fittings is recommended, in which fittings the branch connects to the main at a 45° angle, thus converging the flow of steam and water in the direction of flow. The use of such fittings will go far toward producing positive flow or circulation and eliminating water hammer.

PRIMING AND FOAMING IN BOILERS OFTEN THE CAUSE OF WATER-HAMMER.

Elimination of moisture from the steam has considerable to do with the satisfactory heating of a system. A boiler will prime if it is not thoroughly blown out and provided with clean water, or if it is poorly proportioned and with

but little steam space. Sometimes the water passages are so designed that high velocities result, in particular when the boiler is forced beyond its rated capacity, but more often excessive quantities of foreign or organic matter are the cause of foaming, a condition similar to priming. Both create water-hammer from water entering the pipes, so that it is good practice to use several outlets from the boiler. If each of these is made the size of the main, the velocity of steam leaving the boiler will be cut down and carry over less entrained water.

Another remedy for this condition is to make up a separator from standard pipe and fittings and install it on the steam main at the boiler to take care of any sudden influx of water. This is so designed (Fig. 21) that the velocity of the steam through the outlet of the boiler is decreased by the larger area which it affords.

Unsteady water lines in boilers are also caused by intermittent operation of boilers. The practice of occasionally raising the pressure so that steam will pass up the risers for a brief period, causes surging in the pipes from the variable boiler pressure. Air valves sputter, whistle or hiss, creating offensive odors, then as the pressure is lowered, such air

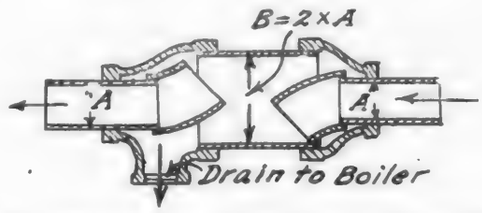


FIG. 21—REMEDY FOR PRIMING AND FOAMING IN BOILERS.

which later has to be blown out of the radiators again. Risers also expand and contract, causing ceiling plates to clack while a non-uniform method of heating is the cause of tenants constantly turning on or off of radiator valves, the noise of which is carried up and down the risers.

RECEIVERS FOR SEPARATION OF WATER FROM STEAM.

Quite often cylinder heads of steam engines are blown out due to water carried over with the steam from priming and foaming, so that separators are installed to prevent such a contingency and to increase the efficiency of the engine by furnishing dry steam to its cylinders.

Water also causes scoring of pistons, cylinder walls and valves of reciprocrating engines and the renewal of blades in turbines.

Superheaters are often used to supply dry steam to the piping, but if distant from the engine, the effect of this superheat may be lost from the radiating surfaces of the pipe. For the same reason, separators designed for the removal of entrained water, should be placed as near as practical to the engine cylinder, and if made of the "receiver" type (that is, a large separators with storage capacity or volume of from two to four times that of the high-pressure cylinder); they will produce a uniform pressure in the engine cylinders.

Separators, and in particular receivers of the large type should be well covered to prevent waste of heat and should also be provided with large size drip pipes. Provision for examining and cleaning the interior should be made since they lose a certain amount of efficiency in course of time, unless the separating surfaces are kept clean. A separator of good design should be selected, one with a large baffle surface and such internal area that the velocity of flow will not be increased, but rather diminished, when passing through this device.

Under certain conditions steam separators will not act as a preventative of water in engine cylinders. For instance, a cold engine in starting up will quickly condense steam in its cylinders so that the throttle valve should be merely cracked until the cylinders are warmed up. Prior to this, the steam main should be thoroughly drained and the drain cocks on the cylinders opened. The practice of rocking the valve gear of an engine back and forth when starting it, does not tend to free the cylinders of water, but on the contrary it closes the exhaust valves, before they would be otherwise, hence water is prevented from escaping freely.

WATER-HAMMER IN THE COILS OF SERVICE WATER HEATERS.

Water-hammer may occur in the coils of service water heaters if these are not properly drained. This has reference, in particular, to the type of heater having two coils, one for exhaust and the other for live steam, each of which should be drained by a separate lifting trap. The transmission of steam to the high-pressure heater coil being themostatically controlled, the regulating valve opens only when the exhaust steam is insufficient to maintain the proper temperature of the water. When the temperature reaches the point for which the thermostat has been adjusted, the regulating valve closes and the steam in the coil condensing, causes a vacuum which will retain the condensate unless drained by a trap of the lifting type. Such a trap has its vent connected to the return from the heater so that the pressure in the coil and trap are the same. Consequently, water will not be retained but will flow to the trap irrespective of the pressure in this coil. If the coil were connected by a non-return trap discharging against pressure, the condensation would be retained in the coil and when the steam valve opened again, the steam at high pressure would mingle with the condensate, causing water-hammer. The efficiency of the coil would also be reduced until the water was removed, a matter which would take considerable time.

The lifting type of trap is operated by three valves, steam, vent and discharge, and is used where the pressure of the condensation is insufficient to discharge the water, as in the exhaust coil of a service water heater. In filling, the steam and discharge valve of the trap are closed, and the vent valve opened, so that any pressure in the trap tending to prevent flow of condensate to it, is avoided. The steam valve is connected to the pressure steam piping and opens, together with the discharge valve, when the trap is discharging, meanwhile the vent valve is closed, but opens after the operation is complete so as to relieve the pressure within the trap.

A non-return trap cannot be used with any degree of success in connection with a service water heater, even if connected to the live steam coil, as previously explained. This type of trap is used wherever the pressure of the condensation is sufficient to lift the water to the point desired. The discharge valve remains closed until the condensation collects, when it opens and the pressure of this condensation forces the water out of the trap, after which the valve closes. The trap in this case does no real work to move the water, since this is done by the pressure of the condensation, which must always be greater than that in the trap discharge pipe.

In the next installment the subject of mechanical vibrations will be taken up, with special reference to fan motor installations, noises from air vibration and vibrations of piping.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

STANDARD MEASURE OF VENTILATION ADOPTED AT ST. LOUIS MEETING, MAY 26-28, 1920

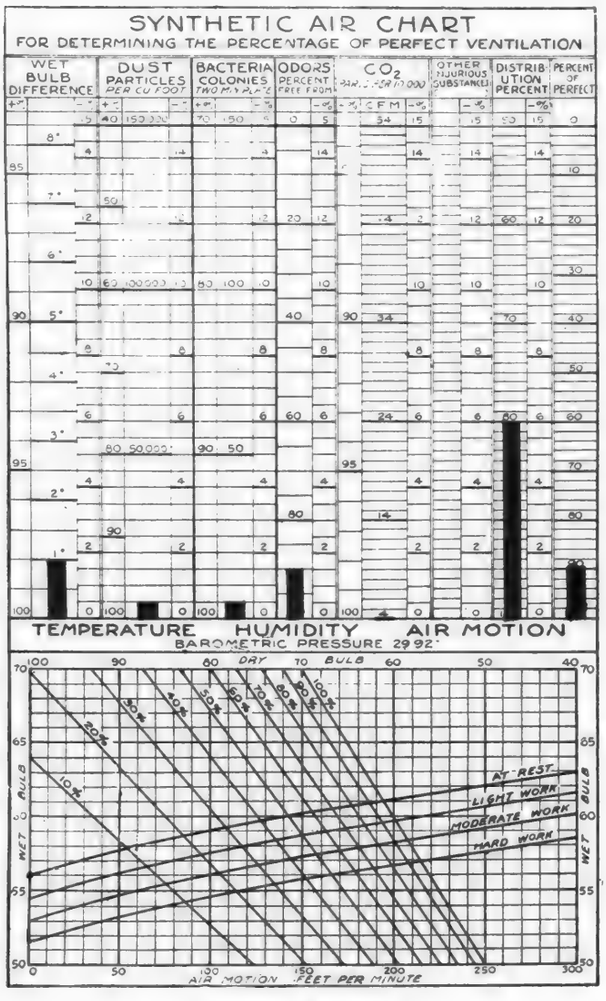
An important action taken at the midsummer meeting of the American Society of Heating and Ventilating Engineers, held in St. Louis, May 26-28, 1920, was the adoption of the well-known Synthetic Air Chart, devised by President E. Vernon Hill and long used by the Chicago Commission on Ventilation, as a standard measure of ventilation. This chart has undergone eight revisions since its original appearance and was characterized by Director Allen of the Society's Heating Research Bureau as containing all the factors that need to be considered in determining good ventilation.

Other features of the meeting were the presentation of new data on ozone as used in connection with the ventilating systems of school buildings, and of data confirming the importance of the wet-bulb temperature as the best basis for establishing the most healthful air conditions.

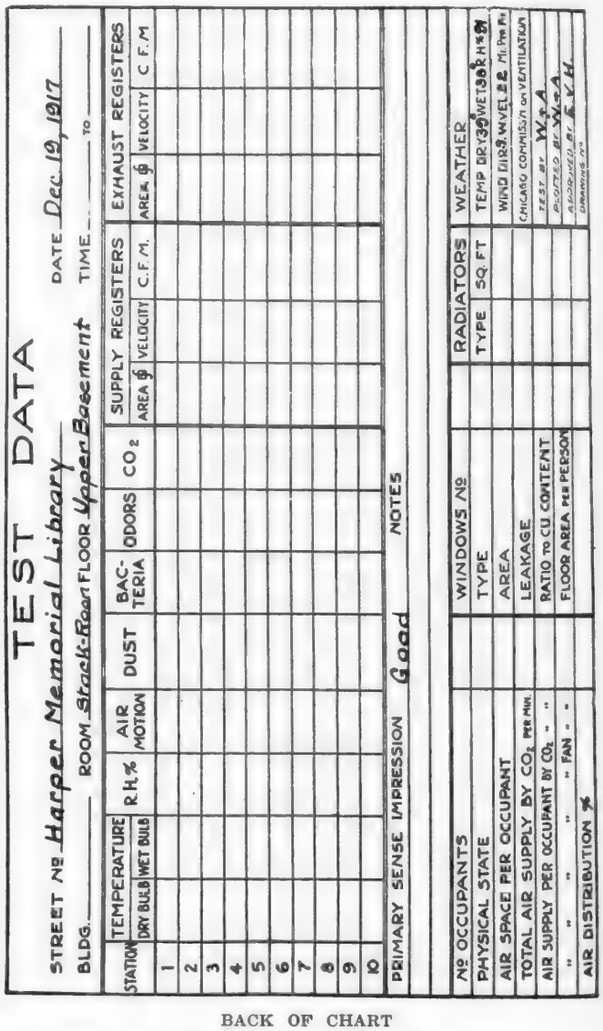
Opening Session, May 26.

The society was fairly well represented at the opening session which was held in the assembly room of the Board of Education Building, with President E. Vernon Hill in the chair.

E. S. Hallett, engineer for the St. Louis Board of Education and president of the St. Louis Chapter, welcomed the society to St. Louis. He was followed by W. E. Rolfe, president of the Associated Engineering Societies of St. Louis, who offered a welcome on behalf of the 1400 engineers of St. Louis.



FRONT OF CHART



BACK OF CHART

SYNTHETIC AIR CHART ADOPTED AS A STANDARD MEASURE OF VENTILATION BY HEATING ENGINEERS' SOCIETY.

A complete description of the theory and application of the Synthetic Air Chart will appear in THE HEATING AND VENTILATING MAGAZINE for July, accompanied by weights and values of the various factors. In brief, it may be stated that the items appearing at the head of each column in the chart represent all of the important factors which go to make up perfect ventilation. Each test figure is entered in its proper place in the columns and the extent to which they vary from a prescribed standard, gives a point in the last column which is the percentage of perfect ventilation.

The chapter reports were omitted as they will be published in the society's Journal.

Favorable action was taken on the report of the Committee of the New York Chapter on Industrial Engineering, which was presented by Frank T. Chapman. The meeting went on record as adopting the recommendations made by the American Society of Mechanical Engineers on this subject and voted to appoint a committee of five to further the movement for better industrial relations.

Mr. Still stated that the relations with labor had been improved considerably during the past few weeks and that the urgency of the need for the movement was not as great as it was even a month ago. He cited the fact that in Detroit there are today 30,000 men out of work.

Other speakers brought out the point that the work was not to be confined to present conditions, but was to be a permanent effort to secure a better understanding on the part of all concerned in the engineering field.

For the Committee to Investigate Capacities of Steam and Return Mains, J. A. Donnelly stated that the work was in progress and he asked the support of the chapters in securing the needed data to complete the investigation.

The discussion of a proposed standard for ventilation was taken up, but owing to the lateness of the hour, it had to be put over to a later session.

The need of a standard code for testing heating systems, which was brought to the attention of the Society by the Standardization Committee of the Heating and Piping Contractors' National Association, was discussed briefly, action being deferred to a later session.

Afternoon Session May 26.

Wednesday afternoon, the society held a joint session with the American Society of Refrigeration Engineers. The first paper was on "New Methods of Applying Refrigeration," by E. S. H. Baars (A. S. R. E.).

This was followed by a paper by Director John R. Allen of the Heating Research Bureau, on "Theory of Heat Losses from Pipes Buried in the Ground."

Other papers presented at this session were on "Heat Insulation Facts," by L. B. McMillan, and by R. P. Brown on "Automatic Control of Temperatures."

Morning Session, May 27.

Thursday morning a joint session was held with the mechanical engineers' and refrigeration engineers' societies. Clemens Herschel (A. S. M. E.) presented a paper on "Weir for Gauging the Flow of Water in Open Channels"; Glenn B. Warren (A. S. M. E.), a paper on "Simplification of Venturi Meter Calculations"; T. S. Taylor (A. S. M. E.) a paper on "Dissipation of Heat by Various Surfaces"; M. S. Van Dusen (A. S. R. E.) a paper on "The Thermal Conductivity of Heat Insulators, and a Proposed Method of Testing Commercial Insulating Materials"; and F. R. Still, a paper on "Ship Ventilation."

Morning Session, May 28.

Before proceeding with the Friday morning session, the meeting voted to appoint a delegate to attend the conference of engineers in Washington, June 3d. The chair appointed vice-president Champlain L. Riley.

Most of the papers at this session were devoted to school ventilation. E. S. Hallett, chief engineer of the St. Louis Board of Education, presented supplementary data to his paper on the use of ozone in school ventilating systems (published in THE HEATING AND VENTILATING MAGAZINE for February, 1920). His subject was "The Significance of Odorless Concentration of Ozone."

The Significance of Odorless Concentration of Ozone in Ventilation.

This paper was supplementary to the one presented by Mr. Hallet at the annual meeting of the society in January (published in abstract in THE HEATING AND VENTILATING MAGAZINE for February, 1920). The new interest in ozone, he said, is a surprise to some and is due to a re-study of the whole situation. Many of the statements made as a result of early investigations were proven conclusively to be erroneous. It has been proven beyond question that Jordan's and Carlson's statement that ozone only masked odors was untrue. It is evident, he added, that the useful applications of this highly beneficial resource of nature has been delayed by the activities of two classes of charlatans: the vendors of portable apparatus who had no knowledge of means of distribution nor of proper concentration, whose extravagant statements could be realized only occasionally and accidentally and the pseudo-scientists who investigated ozone by reference to the "literature" and by attempts to make the experiments fit their conclusions.

WORK OF RECENT INVESTIGATORS.

In recent years, however, many reliable investigators have done really constructive work on ozone. Olson and Ulrich cleared up much doubt. In 1913 and 1914, Dr. M. A. Franklin read papers in this society that, in the opinion of the writer, argued strongly for ozone in ventilation. If laboratory tests and scientific proofs could have brought ozone into use Dr. Franklin's work should have done it, but the practical engineer and his more practical client have not the time or patience to pass on a controversy of theoretical scientists and so the question stood in abeyance.

TEST IN FULL SIZE SCHOOL.

It seemed to the writer that the actual operation of ozone in a full size school with a modern blast fan ventilating system under normal conditions throughout should be conducted; that medical supervision should be made by the official medical staff; that the teachers and pupils should not be "fed up" on any theory but that the response should come spontaneously; that great care should be taken to avoid the effect of the "psychology" in the determinations; that means should be provided for the control of the ozone concentration. All these things were done in the St. Louis schools and are in operation at this moment. The results were briefly outlined in Mr. Hallett's previous paper.

CHEMICAL METHODS FOR DETERMINING OZONE NOT SUITABLE FOR VENTILATION PURPOSES.

It developed early in the experiments that the chemical methods of determination of ozone could not be utilized for ventilation purposes for two reasons: first, the apparatus must be used in all kinds of places and under all conditions in which boilers and fans are used, and chemical tests are not available; second, that odors and such gases as vitiate air are in such low concentrations that no chemical means exist for their detection and likewise the proper concentration of ozone for ventilation is so low as to be measured with the accuracy of "rough approximation" only.

Ozone must now be considered from a new or different angle. For ventilation purposes it must be odorless. Some means of stressing the emphasis on the odorless concentration must be found. The term odorless ozone may subject one to criticism but this restriction is necessary. Ozone must be used with the same limitations as heat, except that heat control must be confined to relatively narrower limits than ozone. We have warming heat and burning heat yet no one discusses the heat of a blast furnace in connection with the warming of a school room. This, to show the absurdity of dragging into the discussion high artificial concentration of ozone.

OZONE IN VENTILATION NOT A STIMULANT.

Ozone in ventilation is not a stimulant. After two years of experience with it in the St. Louis Schools and in the observation of it in the writer's home and in large offices and stores there is no indication of stimulation of the occupants. Stimulants are followed by a reaction or corresponding depression which has never been observed with ozone. The refreshing exhilaration and freedom from languidness are perfectly normal conditions due to freedom from depression resulting from odors and excessive heat. It certainly gives relief from excessive heat, not, of course, by reducing the temperature but perhaps by providing better skin radiation. The effects are not psychological or imaginary for the most striking results have been observed where teachers and pupils were unaware of the presence of ozone.

The long continued test in actual conditions has proven that the effect has not worn off. Nature has a way of adapting herself to new conditions and it was interesting to observe that teachers working in this odorless air now for the second year were just as quick to detect the absence of the ozone as they had been at first. The sense of smell is not dulled by ozone in any degree nor is there anything like anethesia of the senses or other organs. Oxygen is odorless and ozone is received as oxygen until the concentration reaches a point of irritation when it is recognized by the odor.

OZONE AS A PREVENTER OF FATIGUE.

The discovery that ozone in ventilation prevents fatigue is so important that some fuller statement is desirable. That it is a fact is attested by all who have had irksome duties in this air. The engineer has no right to discuss matters of physiology and medicine but he might be pardoned for suggesting unofficially some things that may be discovered and reported in the future. The sense of fatigue may be due to the presence of waste matter in the muscular tissues. As a higher oxygen content of the blood would hasten the removal of the waste, fatigue would quickly disappear.

IMMUNITY FROM SICKNESS OF EMPLOYEES IN OFFICES HAVING OZONE

During the epidemic of influenza of 1918, the writer accidentally discovered that very few motormen of the street car service contracted the disease. As these controllers emit considerable ozone it was surmised that this might be due to the ozone. Further inquiry was made as to the immunity of employees in offices having ozone. All that could be found with such ventilation reported that none of the employees so working had contracted the "flu." This looked like a promising lead. The second epidemic was very severe in the city and while it was at the crest the writer called on the house man of the Brown Shoe Co. which has the main offices supplied with ozone. He stated that of the whole force of several hundred persons only two were out with what they called the influenza but neither of them lost more than three or four days. The floor manager of the basement of the Grand Leader store stated at this time that his absentees list was not greater than at other reasons, and that the absentees were at home nursing members of their families and that none had suffered from the influenza.

This is most startling information. It can be explained only by the fact that ozone increases the oxyhemoglobin of the blood and thereby increases the resistance of the body to all disease. About 90% of the blood are devoted to the oxidation process while the 10% are nutritive. A person will live several weeks without food, several days without water and two minutes without oxygen. Oxidation seems to be the critical process in assimilation. This would seem to be a fresh field for physiological and medical research. Ozone has been used with great success by both inhalation and by incorporation into oils in the treatment of penumonia and tuberculosis. Blood tests have shown a rapid increase in the hemoglobin of the blood from the inhalation of ozone. The medical treatment in the use of iron and arsenic for anaemia is for the purpose of making the nutritive 10% of the blood more susceptible of assimilation, whereas increasing the oxygen of the blood may effect greater results in assimilation.

This digression is made in the hope of shortly seeing ozone put an end to the numbers of anaemic children that have steadily come from the schools. It is hoped that this perfect air may enable the cities to dispense with the open air schools.

The ozone in ventilation must be put on the same rigid practical basis as the heating system. It must have a standard of concentration based upon a mechanical unit and capable of convenient manual control or of automatic control, using chemical processes as a check only. With such equipment kept clean as it must to be effective, no apprehension need be felt that results will not follow as indicated in previous papers.

It was suggested that the society's Research Bureau make tests of the use of ozone to see if the results mentioned by Mr. Hallett could be generally duplicated.

S. R. Lewis presented a paper on "Observations of an Auditorium Having Air Inlets at the Window Sills."

Observations of an Auditorium Having Air Inlets in the Window Sills.

While the installation described by Mr. Lewis was not a unit heating and ventilating system, he said it had some of the features of such a system, especially in the matter of air circulation and diffusion. The auditorium described was a semi-detached combination auditorium and gymnasium, with a stage at the east end and a balcony along the north side. The equipment includes a fan and duct system in the form of a masonry tunnel extending along the south wall. At six points down the length of the tempered air duct are reheaters consisting of cast-iron indirect radiators. The heated air is delivered independently through steel ducts to grilles at the sill line of the seven windows.

A steam jet humidifier is included in the system and there is automatic control of the reheaters.

Observations of the air currents made by the use of Chinese punk, were presented in the form of diagrams and showed generally satisfactory conditions. The author goes on to state that "there seems to be no reason why the stereotyped and time-honored point of entry in a horizontal direction about 8 ft. above the floor should be perpetuated" and adds that "in many buildings very fine results have been obtained with window-sill entry, particularly where it is impracticable to use outlets under the seats. It can hardly be claimed that such a point of entry gains ventilation by displacement, but it seems evident that lively upward currents of warm air in front of windows improve the dilution method of ventilation to a remarkable extent and tend to discourage stagnant pockets and promote general air movement, while being free from unpleasant drafts."

He believed that the conditions would be improved if the inlet were a continuous slot, tending to give a more uniform whirling movement of the entire aerial contents of the room. In this connection he called attention to the fact that the general whirling or corkscrew-like movement here, and the one which he considered of major importance, coincides with his observations of the best Chicago class-room ventilation. Here the corkscrew lies horizontally; there it had a vertical axis. The ordinary class-room he maintained, having the

fresh air inlet on an interior wall, discharging toward the windows, with direct radiators under them, is in a chaotic condition as to its air diffusion.

An important feature of the system described is that the opening of the windows did not affect the ventilation of other rooms.

A paper on "The Ventilation of Large Auditoriums," by R. S. M. Wilde was presented by title.

Ventilation of Large Auditoriums.

Mr. Wilde's paper was devoted to the modern theatre building, including motion picture houses. He cited as the four most important factors in such a ventilating system: cost, operation and maintenance; and the architect. He then went on to discuss several methods commonly used to ventilate such buildings. A system which he described as one of the best thus far developed for "movie" theatres, was:

A main supply unit to supply air to auditorium main floor from the side walls at a rate of 20 cu. ft. per minute per occupant, and a main exhaust fan of equal capacity, exhausting 50% of the air from the floor line and 50% from the ceiling at the rear of the balcony. In addition to this, an auxiliary supply unit placed in the attic and discharging air over the balcony, running full capacity for summer and about one-half capacity for winter service when required.

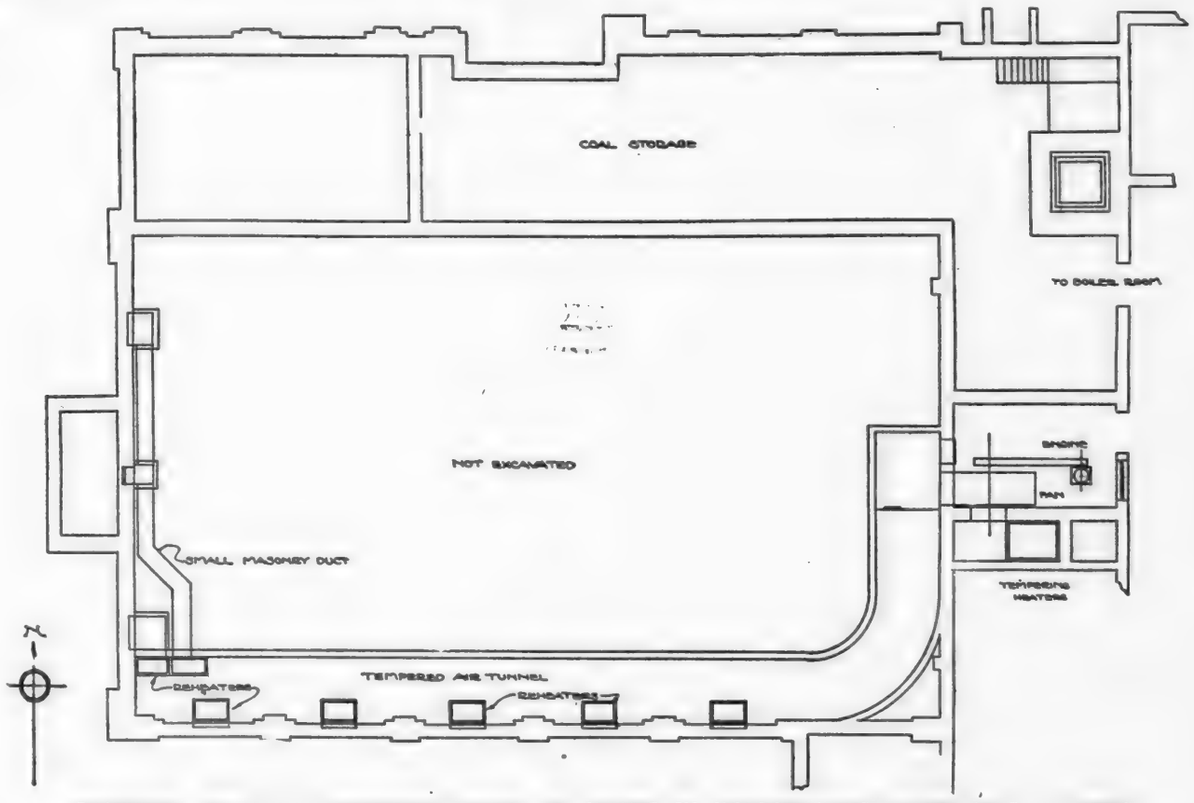
For a very large auditorium Mr. Wilde advocated a down-feed system. He mentions cooling systems using refrigeration, showing how costly they are and bringing up the question as to the effect of the lower temperature on the health of the occupants.

In the discussion Mr. Hart stated that he would differentiate between floor-admission and overhead admission systems. With air admitted through floor mushrooms, he thought hand control gave better results than automatic control because there was likelihood of sudden fluctuations with the latter which were objectionable to the occupants. Where the supply was overhead the fluctuations were pleasant, rather than otherwise.

This paper was followed by one on "The Training of Janitors and Custodians," by E. S. Hallett.

Training of Janitors and Custodians.

Mr. Hallett's paper described a practical effort that has been made in St. Louis to secure efficient operation of the heating and ventilating plants installed in the school buildings in that city. This embraces a course of training for the janitorial force, with classes held every Saturday morning. He said the economy effected in fuel alone as a result of the course amounted to more than $25,000 for the past year. Later a night school was started.



BASEMENT PLAN OF AUDITORIUM WITH AIR INLETS IN WINDOW SILLS—PAPER OF S. R. LEWIS.

Owing to the lack of a suitable textbook, Mr. Hallett stated that he had undertaken to prepare such a book. He presented a list of contents indicating that the book, when issued, will serve not only as a text-book, but also as a manual for managers or for home study.

Mr. Hart thought the society should be congratulated on the paper and he urged the establishment of night schools throughout the country for janitors and custodians.

John Howatt gave his impressions of an inspection of the school buildings in St. Louis, made by a party of engineers the previous day, stating that conditions far above the average had been observed in all of the schools visited. He said janitors' schools are being established in other parts of the country, notably in Minneapolis and Chicago.

Dr. Hill told how the St. Louis school children are made to clean their shoes before entering school. This, he said, is more important than it might appear in that it serves to keep the air clean, as well as the floors and interiors generally.

Mr. Hallett said one reason for the conditions obtained in St. Louis is the fact that the public school system is under the control of the State. For that reason the appointment of janitors is taken out of local politics. The janitors are all civil service men.

The next paper, which was illustrated by lantern slides, was entitled "High Efficiency Air Flow," the author being F. W. Caldwell and E. N. Fales.

The final paper at this session was on "The Sizing of Ducts and Flues," by H. Eisert.

Mr. Still stated that the author might have made an important point in regard to the obstructions to flow such as bolt heads, etc., which would outweigh in importance, many of the other factors, such as frictional resistance.

Mr. Armagnac presented a written discussion in which it was stated:

It is to be noted that the author's method approximates that of Konrad Meier in his work on "Mechanics of Heating and Ventilation." It may be asked, why do not engineers generally use the more exact methods given in this paper. The answer would seem to be in the practical difficulties involved in commercial practice.

The author might have gone a step further than he did and have taken into account the corrections to the volume for leakage in transit, as well as the corrections to the total pressure for higher or lower temperatures of the air to be moved.

Before the session closed the meeting took up a number of proposed revisions to the constitution. It was voted to refer the proposed changes back to the committee for revision.

Final Session, May 28.

Two papers were presented at the final session, bearing on the use of wet-bulb temperatures readings as the best method of indicating proper air conditions. The first paper was by Dr. E. V. Hill and J. J. Aeberly on "The Relation of the Death Rate to the Wet-Bulb Temperature," and the other was by O. W. Armspach of the society's Research Bureau on "The Relation of the Wet-Bulb Temperature to Health."

Relation of the Death Rate to the Wet-Bulb Temperature.

Relation of Wet-Bulb Temperature to Health.

There has long been a desire on the part of heating engineers for some scientific basis for the statement that a definite temperature and humidity condition is the best from a health standopint. In the past it has been necessary to depend largely on the feelings of individuals in arriving at this "comfort zone."

In these two papers it is shown that air conditions outside the limits of the accepted "comfort zone" are accompanied by higher death rates. The first paper was a review of a paper by Dr. Huntington in which the average death rate for certain periods is plotted against corresponding average temperatures and humidities prevailing at the time. The mortality statistics are those of France and Italy from 1899 to 1913 and represent 3,700,000 deaths. The ideal condition, on this basis, is shown to be a temperature of 64° F. with a relative humidity of 80%, giving a wet-bulb temperature of about 60°. His conclusions are:

1. Fairly moist weather is almost invariably more healthful than dry weather of the same temperature.

2. Cold waves, unless of extraordinary severity, are beneficial to health while a rising temperature, even in the winter, is harmful. He distinguishes carefully between a drop in temperature and the continuance of low temperatures.

3. A variable climate is, in general, much more healthful than a uniform climate, even though the latter has an almost ideal temperature.

The results of the analysis, it is stated, agree with the observations of the authors, although they believe the ideal conditions should be expressed as wet-bulb temperature, rather than as a combination of temperature and humidity. According to their experiments, the desirable wet-bulb temperature for still air is 56° during the heating season, and about 60° in summer, due to the fact that less clothing is worn in summer.

Mr. Armspach's paper covered vital statistics in the United States, involving about the same number of deaths as in Dr. Huntington's investigation. His conclusions were:

1. Fairly moist weather is almost invariably more healthful than dry weather of the same temperature.
2. Cold waves, unless of extraordinary severity, are beneficial to health while a rising temperature, even in the winter, is harmful. He distinguishes carefully between a drop in temperature and the continuance of low temperature.
3. A variable climate is in general, much more healthful than a uniform climate, even though the latter has an almost ideal temperature.

Mr. Armspach's study showed that the ideal wet-bulb temperature for physical health lies between 57° and 61°. Of course, as he points out, as the outdoors wet-bulb temperature is used during the non-heating season, as soon as it gets cold weather, it is necessary to determine the wet-bulb temperature that results indoors, as the air is artificially heated. It is assumed that the average dry-bulb temperature indoors for day and night is 65°. To determine the wet-bulb temperature indoors it is necessary to know the grains of moisture present in the air. Since the amount of moisture depends only on the dew-point temperature, the wet-bulb temperature indoors may be closely approximated from the dew point

An idea of the work involved in getting up the data on which Mr. Armspach's paper was based was given by Director Allen, who stated that they were especially compiled by the Department of Commerce.

In the course of the discussion J. R. McColl gave the results of an investigation he had made of 32 school buildings in Detroit, in which he found that for every pound of steam used for heating, three pounds were used for ventilation. In other words, the ventilating load is three times the heating load.

H. Baetz expressed the opinion that much of the troubles of bad air is due to the fact that in supplying heat we first use the air as a heating medium and, second, for breathing purposes. He thought this process should be reversed.

SOCIETY ADOPTS STANDARD AS A MEASURE OF VENTILATION

An important matter was taken up at this time, being a movement on the part of the society to adopt a standard as a measure of ventilation. A resolution was offered by Director John R. Allen, naming the synthetic air chart, as devised by Dr. E. V. Hill, as containing all the points desired for such a standard. After a discussion in which Dr. Hill explained how the synthetic air chart had been developed for the Chicago Commission of Ventilation, the present form being the eighth revision since it was first brought out in 1912, the meeting adopted the resolution unanimously. It was further voted to appoint a committee of five to interpret the meaning of the chart and the methods of determining the quantities considered in the chart.

The concluding papers on the program were by J. E. Whitley on "Commerical Dehydration" and by Wirt S. Scott on "Industrial Electric Heating."

A matter left over from a previous session was then taken up, being on the subject of a standard method of testing heating systems. It was voted that a committee of five be appointed to develop such a code. President Hill stated he was not clear as to just what was meant by such a standard, as the society already has methods for testing the various parts of a system, such as radiators, boilers, etc.

Mr. Donnelly explained how the matter had been brought up at the instance of the Heating and Piping Contractors' National Association, this organization having inserted in its proposal that all tests of heating plants must conform to the code adopted by the heating engineers' society.

Mr. Still said he believed something could be done in this direction, such as establishing where the thermometers should be placed, and what temperatures should be maintained indoors with varying outdoor temperatures.

Before adjourning, a novel suggestion was received from John F. Hale that the annual meeting of the heating engineers be held in Philadelphia, with a business session in New York to fulfill the requirements of the constitution.

Mr. Hart suggested that the annual meeting be held in Pittsburgh at the Research Bureau and that the semi-annual meeting be held at about the same time and in the same place as that of the heating and piping contractors, preferably in Atlantic City.

A vote was taken in which Mr. Hart's suggestion was accepted as the sense of the meeting.

The meeting then adjourned.

The Entertainment.

Due to the fact that the meeting was held simultaneously with the meetings of the mechanical and refrigerating engineers, unusual opportunities for entertainment were offered. On the first day of the meeting the entire convention party visited the Bevo plant of the Anheuser-Busch Company at the South End. In the evening the party saw "As You Like It," presented by students of Washington University at the Municipal Open Air Theatre in Forest Park.

Thursday afternoon the party was taken up the Mississippi River on the steamer St. Paul to Chain of Rocks where the filtration and pumping plant of St. Louis Water Works is located.

In the evening a joint banquet was held at the Hotel Statler, the principal speakers being President E. V. Hill of the heating engineers, President F. E. Matthews, of the refrigerating engineers, and Carl J. Baer, head of the Industrial Department of the St. Louis Chamber of Commerce.

Mr. Baer spoke on "The Engineering Problem in Reconstruction." His address was an analysis of the big nation-all problems facing the contry which, he said, are essentially engineering problems. He separated the activities of the country into three great divisions: Civics, embracing the home, church, school, etc.; production, including also industry, which he classified as secondary production; and distribution, embracing commerce and transportation. These were presented as segments of a wheel with the administration at Washington as the hub and the people as the rim.

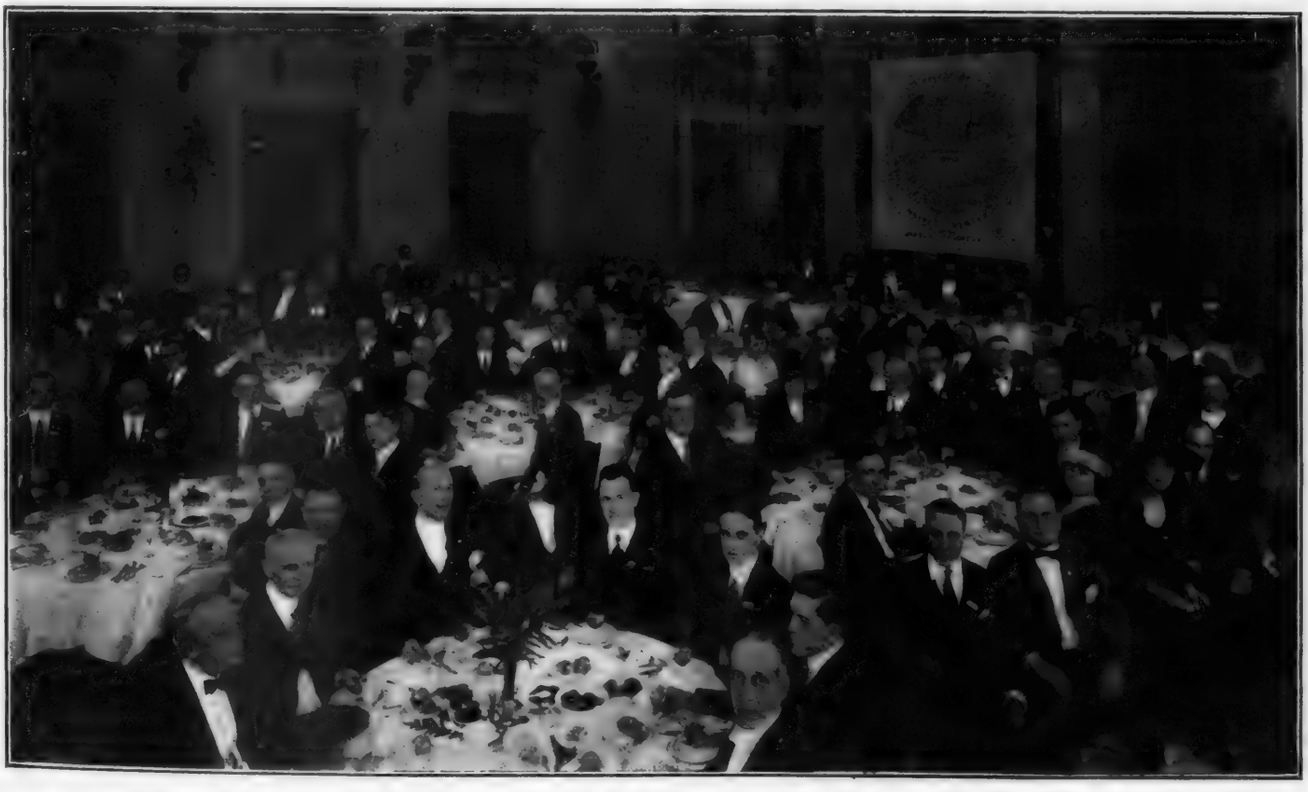
The first essential, he said, is to make sure of the rim, and he pleaded for greater unanimity of purpose on the part of the public. As to the administration he said, "Let's have a little more business in the hub, instead of politics."

One point he made was that we are thinking in terms of industrial production while the need of the times is for thinking in terms of raw production. Factories, he said, should be located at points of raw materials.

He said we realize now the error of having our railroads parallel the rivers. The present freight car congestion was a striking illustration of the way the railroads had been developed at the expense of the rivers, so that in a crisis such as that we are now facing, we find our great waterways practically useless.

On Friday the ladies went on an automobile ride through the parks of St. Louis.

The local committee in charge of the entertainment came in for many expressions of thanks for its splendid management of the entertainment features. E. P. Bradley was the chairman, the other members being A. H. Riley, Walter Moon, Walter Klein, J. L. DeNeille, Harry Tabler, A. E. Humphrey, A. M. Lane, V. D. Rossman and E. S. Hallett, president of the St. Louis Chapter.



JOINT DINNER OF HEATING AND REFRIGERATING ENGINEERS AT HOTEL STATLER, ST. LOUIS, MAY 27, 1920.

HEATING AND PIPING CONTRACTOR'S NATIONAL ASSOCIATION

LABOR SITUATION HOLDS CENTER OF STAGE AT THIRTY-FIRST ANNUAL CONVENTION IN CLEVELAND O., 24-27, 1920

WITH the labor problem the predominant factor in the plans of heating contractors, it was especially fortunate that the thirty-first annual convention of the Heating and Piping Contractors' National Association, held in Cleveland, O., May 24-27, should have attracted the largest attendance in the history of the organization. A large part of the convention's time was devoted to a consideration of the policy to be followed in future dealings with labor and secretaries of State associations were urged to keep headquarters informed regarding all outstanding labor agreements and to report promptly any new agreements made. It was made evident that the association is to take a firmer stand than ever before in its attitude towards the unions, although no official statement was made on the subject.

The convention itself was brimful of enthusiasm and leaves in its wake a constructive program of achievement to be followed out by its officers during the coming year. Chicago's heating contractors came to Cleveland with a delegation of nearly 80 members. Cleveland was also well represented, while a special party from Boston made its presence felt at all stages of the proceedings.

The convention sessions were held at the Hotel Cleveland. Although technically the convention covered a period of only three days, the deliberations of its various official bodies lengthened the period into a working week, as the State secretaries assembled for two executive sessions as early as Sunday, May 23, carrying on their discussions coincidentally with the national Board of Directors throughout Monday, the 24th. Every conceivable phase of the operations of the heating and piping industry was considered, the results of the deliberations of these two sets of officials appearing in the various reports and recommendations submitted to the convention itself. All of the directors of the association were present, and the policy of assuring periodical meetings of the secretaries of constituent locals was justified by the presence of no less than fifteen of these officials.

The formal opening of the convention took place Tuesday morning, May 25. In the absence of the newly-elected mayor of Cleveland, William S. Fitzgerald, the welcoming address was made by the Cleveland Law Director, William B. Woods, whose words of greeting were enlivened by interesting references to the early history of the "Western Reserve" and the "Forest City."

PRESIDENT'S ADDRESS.

President William H. Oakes then presented his annual address. After reviewing the objects of the association, Mr. Oakes sounded a call for action on the principles on which the association is founded. Enumeration of principles, he declared, is not sufficient. Action is needed to carry them into effect. Up to the present the association has been passing through the formative period, but it is time now to enter a period of progress and accomplishment.

He called attention to the form of proposal adopted by the association. Much of the future work of the association, he declared, will fall on the shoulders of the Committee on Trade Relations and he stated that the results accomplished so far by the association had not been discouraging.

Before the next order of business was taken up, Former President Elias D. Smith addressed the meeting to express his thanks for the many messages of greeting sent him on his recent eightieth birthday anniversary. Stewart A. Jellett replied in a happy vein, declaring that eighty years means nothing to a man like Mr. Smith and extended the congratulations of the association in his continued good health and his sustained interest in the association, as evidenced by his presence at this convention.

COMMITTEE APPOINTMENTS

The various committee appointments were announced, as follows:

Credentials, J. J. Herlihy, chairman.
Nominating. Edmund Grassler, chairman.
Appeals and Grievances, Noble P. Bishop, chairman.
Association Improvement, Juan A. Almirall, chairman.
Auditing, John H. Curtin, chairman.
Distribution of Reports, E. C. Claffey, chairman.
Resolutions, M. L. Crowell, chairman.
Reception, W. B. Van Sickle, chairman, the other members of the committee being the entire Cleveland local association.
Introduction, William G. LeCompte, chairman.

REPORT OF BOARD OF DIRECTORS.

The report of the Board of Directors was presented by George M. Getschow, chairman. In connection with the matter of legislation, the report stated that no case had come to the attention of the board during the past year of a single act of legislation which was detrimental to the best interests of the trade. This, he stated, was largely due to the association's watch of pending leglislation and full credit was given in the report to the National Boiler and Radiator Manufacturers' Association in keeping headquarters advised of pending bills affecting the heating industry.

The report referred to a request received from the International Plumbers and Steam Fitters' Union for a joint conference with the heating contractors' national association. The work of the Trade Relations Committee, it was stated, has been divided into two sub-committees, one for the east and one for the west. The report urged all members to make it a point to file all labor agreements with the secretary of the association. A recommendation was included for an increase in the members' dues to meet the increasing costs of operation.

It was stated that the sum of $250.00 had been subscribed towards the proposed new building of the Chamber of Commerce of the United States in Washington, while another subscription of $250.00 was made to the work of the National Trade Extension Bureau. In addition, the association has already subscribed $100.00 towards the heating engineers' Research Bureau. At a later session when the matter of a further subscription to the Research Bureau was brought up, it was referred to the incoming board of directors, after the merits of the bureau and its importance from the viewpoint of the heating contractor had been presented by Stewart A. Jellett.

In concluding the report of the Board of Directors Mr. Getschow stated that the board had discussed proper laws for licensing heating and plumbing contractors and these are now under consideration in several localities. He also referred to the eligibility of candidates for membership in the association and stated that the line had been drawn against concerns which install heating apparatus in their own

speculative building projects and against general contractors.

The report of Secretary Henry B. Gombers showed the present membership of the association to be 737 members, a net increase of 31 over the previous year. During the year 103 new members were added to the rolls and 73 dropped. The report referred to the deaths of Edward P. Bates, John C. F. Trachsel and William T. English. A tribute was paid to each of these members, all of whom have held prominent places in the councils of the association, Mr. English being chairman of the Committee on Standardization at the time of his death last December.

Tuesday afternoon and evening were given over to an automobile drive of some fifty miles through Cleveland's manufacturing district and through its residental suburbs upon the Heights and skirting Lake Erie, the entire party being the guests of the Cleveland local association. The drive wound up at beautiful "Oakwood on the Lake." Almost 400 members and guests participated in this unique tour, the cavalcade of automobiles being close to half a mile in length.

The party returned to the hotel in time for the reception and buffet dance in the ball room of the Hotel Cleveland, which also served as the convention hall. A grand march opened the dance, led by President William H. Oakes and Mrs. Oakes. Midnight drew a reluctant veil over the proceedings of a memorable and enjoyable day.

WEDNESDAY SESSIONS.

At the Wednesday session the report of the treasurer, Earnest T. Child was presented, showing the association to be in a strong position financially. The greater part of this session was devoted to a stereopticon discussion of the result of the "overhead" survey recently completed for the Cleveland Association by a local firm of auditors under the direction of the National Trade Extension Bureau. A special committee of heating contractors, composed of Edward Maurer, a former president of the Cleveland local and James Miles of the Miles Heating and Ventilating Company, co-operated in the work. The charts presented in a graphic manner the results of almost two months of patient study by a trained investigator and were placed at the disposal of the convention by the Cleveland association. The charts were dissected and analyzed in open session by George R. Boyle, of the Trade Extension Bureau, and by George Rhodes, the auditor in charge.

This enterprise, unique in the annals of the industry and significant of the growing tendency to search out the weak spots in the country's industrial structure, aroused deep interest on the part of those present and was considered an accomplishment of unusual importance.

The balance of the Wednesday morning session was devoted to matters which were discussed in executive session.

At the Wednesday afternoon session the principal speaker was Judge F. L. English of St. Louis who delivered an address on "Laws Affecting Contracting, Sales and Labor Combinations." He pointed out the various stages of development of common and statute law, and gave a sketch of federal and State enactments and court decisions bearing upon inter-state and intra-state commerce, control of commercial relations and the changing status before the bars of courts and public opinion of labor organizations.

George Doyle spoke at this session on the work of the National Trade Extension Bureau. He outlined the plans of the bureau for co-operative effort for the benefit of the pipe trade of the country, including the exhaustive collection of all manner of data and the placing in the field, in the near future, of at least half a dozen trained men to visit the heating contractors throughout the country upon a joint mission of propaganda and education.

The balance of the Wednesday session and the entire session of Thursday morning were devoted to the reports of the Committee on Trade Relations, the Conference Committee, Standardization Committee, Resolutions Committee and the Committee on Association Improvements. All of these reports were submitted in executive session.

Under the heading of reports of State and local associations, a comprehensive resumé of the activities of the Cleveland association was presented by its acting secretary, Edward Bohn, and was received with a vote of thanks and ordered printed and distributed to the secretaries of all local associations.

From the standpoint of entertainment, Wednesday was a busy period. The manufacturers and their representatives, under the leadership of William G. LeCompte, of Jenkins Bros., a veteran in this capacity, tendered to the visiting ladies a noon-day luncheon at the Hotel Cleveland, followed by a theatre party at Keith's Hippodrome.

NEW OFFICERS.

The election of officers resulted as follows:

President, J. E. Rutzler, New York (past vice-president and former treasurer, a son of the late Enoch Rutzler, who was himself a past president and the first member to serve as chairman of an executive committee of the national association).

Vice-President, N. Loring Danforth, Buffalo, N. Y. (a son of John W. Danforth, a charter member).

Treasurer, Harry G. Black, Philadelphia.

Sergeant-at-arms, John T. Bradley, St. Louis (re-elected).

Directors (for the three-year term): Frank A. Merrill, St. Louis (former chairman of the Trade Relations Committee); James B. Walker, Pittsburgh; Joseph F. Gunn, St. Louis (re-elected).

After the usual resolutions of thanks, the convention adjourned and the newly-created Board of Directors held a special meeting to take up the work outlined by the convention.

Convention Notes.

As an interesting side light upon the convention, it is worthy of note that the Chicago association was represented by 75 out of its total membership of 115. Pittsburgh sent its entire membership, Milwaukee 75% and other cities as far west as Denver and as far east as Boston sent strong delegations.

A unique and colorful feature of the convention was the exhibit of heating and allied appliances. The exhibitors included the Clark-Fisher Co., Keasbey & Mattison Co., Ric-Wil Co., Fairbanks Co., Tomlinson Steam Speciality Co.; Shurtite Mfg. Co., Frederick Leonhard, Union Radiator Co., Efficient Vise & Wrench Co., Bishop-Babcock Co., Greenfield Tap & Die Co., American Blower Co., Johnson Service Co., Oxweld Co., Speed Products Co., American Radiator Co., R. E. Bronson Co., Jarvies Gas & Oil Burner Co., and the Ideal Heating & Equipment Co.

Unreserved praise was given the Cleveland association which through its special convention committee, comprising Mortimer L. Crowell, Richard H. Morgan, Edward Maurer, National Director W. B. Van Sickle, Julius Roemer, N. C. Clark and Acting Secretary Edward Bohn, arranged all details of entertainment, welfare and exhibits.

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IF any doubts existed in anyone's mind as to the need of substituting wet-bulb for dry-bulb temperatures in determining healthful air conditions, they should be dispelled by the facts brought out in two recent investigations reported at the St. Louis meeting of the heating engineers' society. The unusual basis used, that of the mortality statistics for a period of years, gives a touch of novelty to the investigations but, nevertheless, the significance of the figures presented is unmistakable. In one case the death totals for 14 years in France and Italy were obtained and the average of all deaths occurring under certain definite conditions of temperature and humidity determined. Briefly the results obtained showed the death rate was regularly at its lowest point when the air conditions corresponded to a wet-bulb temperature of 60°. Actually the ideal condition obtained with the dry-bulb at 64° and the relative humidity at 80%.

In the other investigation an equal number of deaths in the United States was taken and here it was found that the low point in the death rate was reached with a wet-bulb temperature between 57° and 61°. Both a higher and lower wet-bulb showed marked increases in the number of deaths.

We have, then, the evidence that a definite average wet-bulb temperature between 57° and 61° F. is the ideal condition for human life. This gives us a simple and easily-fixed standard that may be used to cover any given case whether indoors or out, and permits of the much-desired element of variation in the dry-bulb which, it is now generally recognized, is an essential element in the matter of comfort. In fact both investigations emphasize this point, the authors in one case showing that "a variable" climate is, in general, much more healthful than a uniform climate, even though the latter has an almost ideal (dry-bulb) temperature.

So we find from an unexpected source a striking confirmation of the "zone of comfort" first established by Professor J. W. Shepherd and originally published in THE HEATING AND VENTILATING MAGAZINE for October, 1914. It will be recalled that the "line of comfort" through the center of this chart is 56° F. wet-bulb. In view of the array of evidence that has gathered against the dry-bulb thermometer, the surprising thing is that it has so long been permitted to hold its place as a suitable index of air conditions. It has been very much like measuring the brilliancy of an electric light by the intensity of the current. As a matter of fact, however, it is only since the rise of air conditioning engineering that heating engineers have realized the importance of humidity in other than industrial processes. It is apparent now to all that the dry-bulb thermometer has received a blow in a vital spot and we may expect gradually to see its elimination as the keystone of the heating system. In short, we are on the threshold of the Wet-Bulb Era.

THE battle of theory vs. practice goes merrily on, and the engineering journal that endeavors to make itself of the greatest usefulness to its readers is constantly confronted with the necessity of making the choice between greater refinement and wider practicability. These remarks are called forth by a comment on certain data sheets published in THE HEATING AND VENTILATING MAGAZINE, relating to the sizing of air ducts. No one can be more keenly interested than a responsible engineering journal in the advancement of both theory and practice, and for that reason it is a distinct service to point out and correct the shortcomings of any method of calculation, if it has any. It is probably true, however, that in no other line of work is the chance for error or failure to consider all the conditions more common than in air duct design. As an engineer once aptly expressed it, we provide a fairly liberal factor of safety, when we install volume dampers controlling the air delivery from 50% up. So while theoretical refinements are highly desirable and should be welcomed, the fact remains that their application must harmonize with conditions as they exist and they must be susceptible of quick and easy use by those most concerned.

NIGHT classes for janitors and custodians of school buildings is the interesting expedient adopted in St. Louis for securing more efficient operation of the mechanical equipments of its buildings. The plan has been in operation during the past winter and has met with such success that other cities are waking up to its possibilities as a practical means of securing the benefits sought for in the proposal to place the operating division under the direct control of the engineering department.

WRINKLES

A Method of Connecting Returns to One or More Boilers, Without Check Valves.

A scheme for attaching the return connections to a steam boiler at the water-line without using check valves, to prevent the water from being backed out of the boiler and to maintain equal water levels when two boilers are connected together, has been devised as the result of a series of experiments at the plant of the H. B. Smith Co., Westfield, Mass., and reported by S. F. Jeter, chief engineer for the Hartford Steam Boiler Inspection and Insurance Company.

By attaching the return connections at the water-line, states Mr. Jeter, it appears that all the functions performed by check valves may be duplicated and the several disadvantages eliminated. In the case of cast-iron boilers it would require special connections arranged to return the water at the water-line, and in many cases it might not be proper to discharge the water at such point. However, by placing an equalizing connection from the steam outlet to the bottom of the boiler the returns may be connected to this equalizer connection at a point opposite the water-line. In effect this will be the same as attaching the returns directly to the boiler at this height, except that the water will actually enter the bottom of the boiler as is now customary.

With such connections the unbalancing effect of the check valves is avoided in the case of two or more boilers operacted together and a much steadier water-line will result. Water cannot be backed out of a boiler lower than the point of connecting the returns to the equalizer connection, provided the upper or steam side of the connection is of ample size.

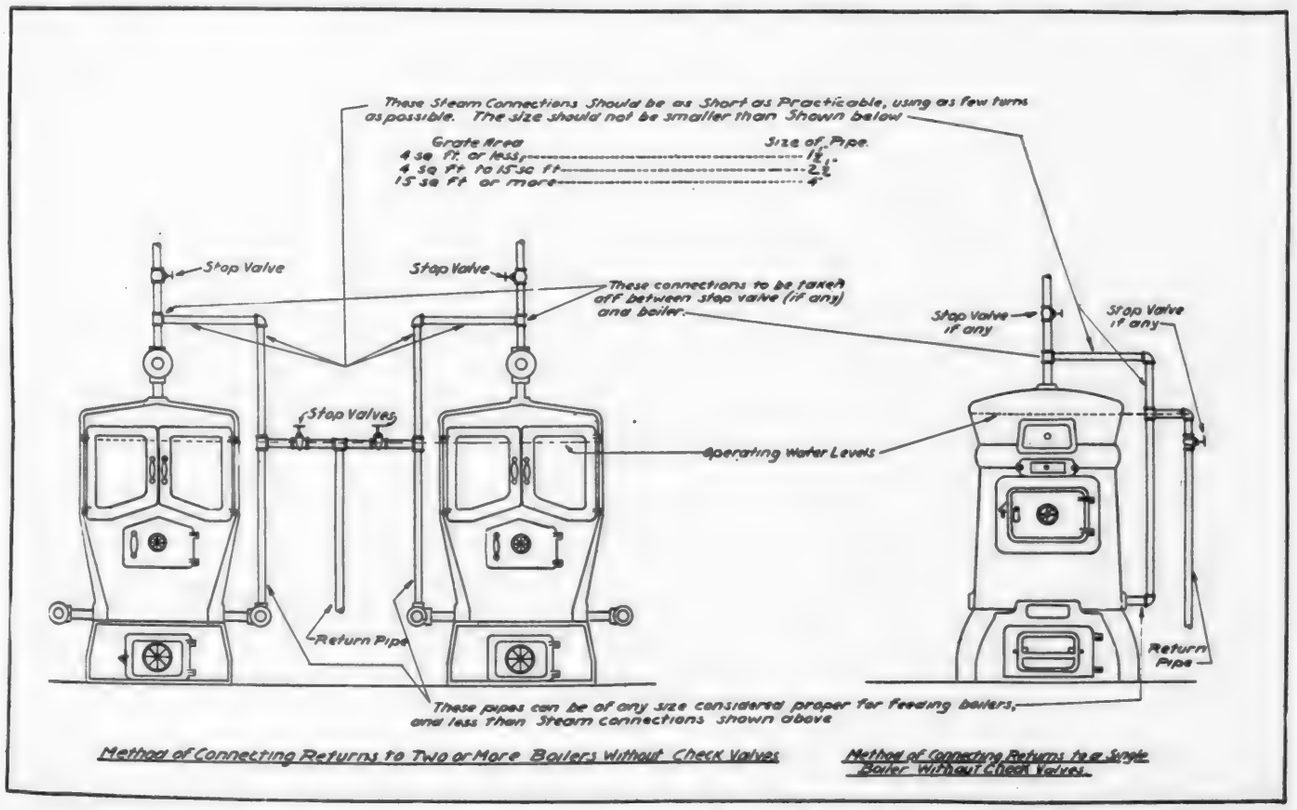
Another advantage of this arrangement, it is pointed out, is that in case the boiler should be fired with the stop valve on the steam outlet closed, but with the valve on the return outlet open, the boiler would still be connected to the system. This would tend to keep the pressure within safe bounds. At the same time attention to the condition would be brought to the attention of the operator by water-hammer action in the returns.

A Portable Home-Made Erasing Machine for the Drafting Room.

Recent years have not only seen the draftswoman and woman engineer introduced to the engineering field, but also modern drafting and other tools, such as the erasing machine shown in the photograph.

Such a machine can now be bought on the market for about $50.00, but is only made to order so that home-made devices are still designed by various engineering offices for their own uses. They are easily made by purchasing a second-hand dental arm, usually at a cost of about $10.00, and attaching this to an ordinary desk fan from which the fan blades have been removed. Most motors run clockwise, but the dental arm must run counter clockwise or the coil would wind up and bind. There are various ways of overcoming this, one of which is shown in the illustration, a pulley being mounted on the oscillating end of the fan shaft and belted to the dental arm.

The base of the fan is screwed to the usual drafting stool and this is mounted on a 2-in. x 4-in. frame equipped with


These Steam Connections Should be as Short as Practicable, using as few turns as possible. The size should not be smaller than Shown below
Grate Area
Size of Pipe
4 sq ft. or less
4 sq ft to 15 sq ft
15 sq ft or more
Stop Valve
Stop Valve
These connections to be taken off between stop valve (if any) and boiler.
Stop Valve if any
Stop Valve if any
Stop Valves
Operating Water Levels
Return Pipe
Return Pipe
These pipes can be of any size considered proper for feeding boilers, and less than Steam connections shown above
Method of Connecting Returns to Two or More Boilers Without Check Valves
Method of Connecting Returns to a Single Boiler Without Check Valves

SCHEME FOR CONNECTING RETURNS TO TWO OR MORE BOILERS WITHOUT CHECK VALVES.

castors and the necessary length of wire, so as to be easily and quickly moved from one desk to another as required.

An eraser of the ordinary equality is attached to the end of the dental arm, but it must be made to order in the round form and punched exactly in the center so as to run true. Better results are secured by running on the slow speed since at such speed the rubber will not soften and smear or burn the tracing cloth, as all draftsmen know even when using a rubber by hand. The machine will do the work in about one-tenth the time required by hand and is especially desirable where there is any considerable amount of such work to be done, as is the case in any large drafting room.

The Use of T and Y Fittings Where Change of Direction Occurs in Blow-Off Pipes.

Installation of blow-off pipes is best made with screwed plugged Y's where change of direction occurs. Another method is to use cast-iron flanged tees with one end of the run fitted with a blind flange. The latter method makes the pipes quickly accessible for cleaning out. In both cases the scale collects in the dead end of the fitting, instead of wearing out the back of an ell, as would otherwise be the case.

Some of the Things a Layman Can Do to a Heating System.

Quite frequently the layman, in an effort to save the cost of skilled services, will attempt his own engineering and even the pipe fitting with unsatisfactory results and increased expenditure in the end, somewhat as shown in the sketch selected from an actual installation.

It is interesting to note how one unskilled would go about such an undertaking. Knowing nothing about the principles of water or other heating, except that it is necessary to heat water, he would quite naturally follow the line of least resistance, that is, use as few fittings as possible and work according to the geometrical axiom, "A straight line is the shortest distance between two points."

This is illustrated by Fig. I, in which at "A," the flow of return water from the different radiators oppose each other at the tee fittings. Such connections in the flow lines are also poor practice and this is true even in a steam heating system. What would result in this instance is the heating of radiator "C," since this is the radiating surface nearest to the boiler, and the retarding of the return from radiator "D." In like manner, "E" would not heat satisfactorily with either "C" or "D" in operation.

STEAM RADIATORS USED IN WATER HEATING SYSTEM.

Stranger things than these have happened, since an instance has been known wherein the owner buying his material second hand from junk yards, had bought at one time a water boiler and later steam radiators, which when connected up in his home for a water heating system, quite naturally refused to operate, except in a minor degree. Now, steam radiators, as is well known, have the sections joined by nipples along the bottom only, while water radiation has them joined along the top as well, a thing which is quite essential to the circulation of water. Consequently, the circulation in the case in mind, was extremely poor, so that the system froze up during a severe winter, with the result that the boiler cracked in certain sections and leaks were sprung in many of the pipes.

Either steam or water radiators would have been correct had the installation been operated as a steam heating system. Furthermore, if the radiators had been purchased directly from the trade, it would have been necessary to specify either of these kinds before the order could have been filled. Another error was, that the air valve, though of the compression water type, was not at the high point, but instead had been located one third the height of the radiator from the top, as in steam heating.

MAKING A BAD SITUATION WORSE.

After the accident previously described, the owner renewed the piping but not the boiler, since he proposed to make further use of this by cementing the cracks. Prior to connecting up the pipes and before starting a fire, the boiler only was filled with water and no leaks were found. Satisfied from this that the cement would hold, the owner started the

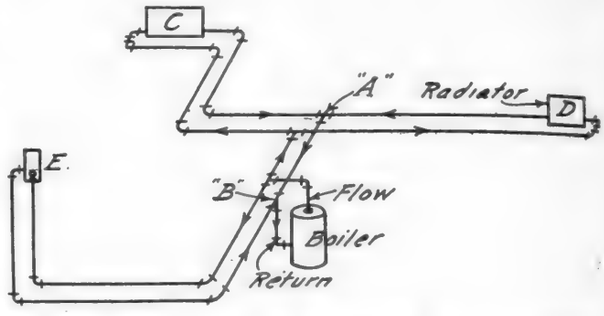


FIG. 1—HEATING SYSTEM INSTALLED BY A LAYMAN.

fire, and though the heater was without the steam space of a steam boiler, partially heated the radiators as in a steam system. When, however, the steam pressure raised to about 2 lbs. a slight amount of steam began to escape through the leaks. This did not cause him any worry, since he reasoned that the heater now being run as a steam boiler, was never so hot or had had such a pressure on it before. He failed to understand that once the system was finally filled up to the expansion tank for water heating, the static pressure or head of the water even without a fire, would be much greater than the steam pressure and therefore there would be a greater liability to leaks.

The owner also labored under the delusion that the expansion tank was for the purpose of increasing the circulation in the system rather than as a safety valve, and did not realize that so long as the system was operated by steam, there would be a continous wastage through the vent pipe at the tank. Finally in connecting up the radiators he had carefully pitched the flow mains and branches, but not the returns.

A CASE WHERE COMMON SENSE WAS USED TO ADVANTAGE.

While attempts of the layman to do his own engineering generally results in failure, there may be on the other hand, instances wherein only he would find the solution to a problem baffling to all. This is because his mind is untrained or rather trained to look for ordinary things. A practical man is wont to find a practical solution where as the technically trained is more apt to bring into play his technical forces.

Coming from the general to the specific, a certain real estate man was conducting a prospective tenant through a dwelling, which though apparently the equal in all respects of those adjacent, was offered at a surprisingly lower figure. This bringing forth comment from the prospective tenant was answered frankly by the agent who told him that the chimney draft was far from sufficient and therefore the heating very poor. The former, saying nothing, wandered about the building by himself. Coming in course of time to the heater connection at the chimney in the cellar, he discovered at lot of old rubbish piled about its base, which had evidently been there indefinitely. This he removed, only

to find that the chimney was entirely open at its base, either due to some forgotten fireplace or failure to brick up. From this, it was apparent why the draft was insufficient. Needless to say, the prospective tenant bought the house at the lower figure, saying nothing meanwhile of his discovery, and of the chimney which later was bricked up and worked to entire satisfaction.

IMPORTANCE OF BRICKING UP PASSAGES FOR GAS.

A more striking instance of failure to brick up passages for gas may be cited in the case of a Canadian governmental institution wherein the boiler room staff was in part made up from the milder of the insane tenants. In the particular heating plant in mind, there was a space of about 10 in. which was finally discovered between the center wall and first row of economizer tubes, which space was supposed to have been bricked in at the top to prevent the escape of flue gases into the boiler room. This space had been left open on the left-hand bank of economizers, which together with the high resistance of the smoke connection and dirty condition of the equipment, no doubt account for the fact that; as the boiler room staff were wont to say, "We are smothered out when we try to blow through the economizer."

BREECHING CONNECTIONS SHOULD BE SHORT AND DIRECT.

The importance of making the breeching connection as short and direct as possible cannot be over-emphasized and where the gases are in opposition some such deflector as shown in Fig. 2 must be installed to divert the proportionate amount of flue gases from each boiler into the chimney. As an example of the former, in this same heating plant, the breeching connecting boiler to the economizer and smoke

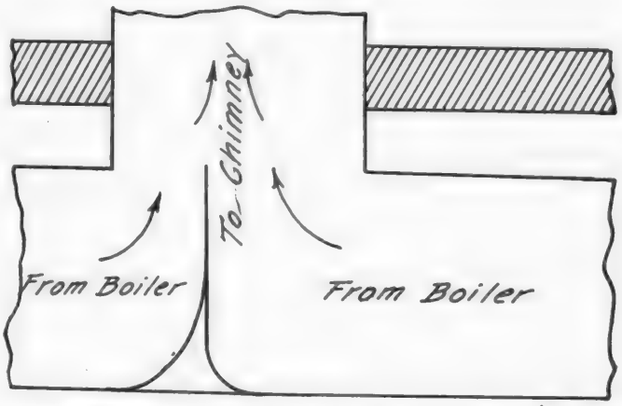


FIG. 2—USE OF DEFLECTOR IN BREECHING CONNECTION FROM TWO BOILERS.

stack was badly arranged. Before the gases from the left-hand boiler reached the stack, the connection made four 90° bends, three of these bends being with very short throats and one with a straight 90° angle. Furthermore, the smoke connection from the right-hand battery of boilers joined the main flue at a 90° angle without any radius at either side. When passing through the economizer, the gases from either battery made three 90° bends before entering the stack where another very sharp turn upwards at less than 90° was made.

Even with the economizer by-passed and the smoke going straight to the stack, there was considerable amount of flue gases always present in the boiler room, due evidently to the high resistance of the smoke breeching, causing a back-draft through the fire-cleaning and inspection doors of the boilers, etc., a thing which was especially evident during the cleaning of fires.

Cheap labor is not always cheap in the end, if it results as in this instance, among many other things, in a lot of ill-kept dirty equipment. The economizers were in an exceedingly poor state of cleanliness. No satisfactory information could be obtained as to when they had been last cleaned and upon opening the side cleaning doors, the tubes could not even be seen on account of the mass of accumulated soot. The overhead cleaning gear was very dirty and rusted, while the belt drive for operating the scrapers was not even connected. No doubt the insufficient draft helped in the formation of smoke and the unclean condition of things in general.

LEGAL DECISIONS

Increases in Rates—Monthly Bills.

The city of Hartford, Wis., obtained authority from the Wisconsin Railroad Commission, on petition, to increase its rates for steam heating service to the following rates. Quantities in one month: First 25,000 lbs. 60 cents per 1000 lbs.; second 25,000 lbs., 55 cents per 1,000 lbs; third 25,000 lbs., 50 cents per 1,000 lbs.; all over 75,000 lbs., 45 cents per 1,000 lbs.

Amount of Recovery on Heating Contract—Acceptance by Owner.

A heating and plumbing contractor contracted in writing to install in an apartment house certain heating and plumbing apparatus, included in which was 1,700 sq. ft. of radiation. In an action for a balance due on the contract the owner claimed that certain valves and stop-cocks required by the health department were omitted by the plaintiff and that there was also omitted from 76 to 154 sq. ft. of radiation. The plaintiff sued for the balance of price agreed on in the written contract, less credit for shortage in radiation and certain other allowances, and an additional amount for extras; the account showing a balance of $477.13. The jury gave a verdict in favor of the plaintiff for $414.91. From a judgment thereon the owner appealed.

In affirming the judgment, the Maryland Court of Appeals holds, J. L. Robinson Const. Co. v. Berry, 108 Atl. 688, that where the plaintiff has in good faith performed, but not in the manner prescribed by the contract, and the defendant has sanctiond or accepted the work, recovery may be had under the count for work and labor done and material furnished for the reasonable value of the work so done and accepted; the defendant, in this case, being entitled to recoup for the damages he may have sustained by the plaintiff's deviation from the contract not induced by himself.

Basis for Increase in Rates.

In granting the application of the receiver of the Logansport Heat & Power Company for an increase of water and steam heating rates to meet an emergency, the Indiana Public Service Commission took, as the basis of calculation, coal consumption of approximately 80 to 85 lbs. per square feet of radiation per season for water heating service, and 120 lbs. per square feet of radiation per season for steam heating service as being reasonably efficient for the requirements of the utility.

Breach of Oral Agreement to Furnish Tenant with Heat.

A lessor orally agreed with a lessee that, if the latter would not give written notice required to terminate the lease for failure to heat and would continue to occupy the apartment, the lessor would furnish a proper supply of heat and hot water, and, if she failed to do so, would not hold the lessee liable under the lease. The Massachusetts Supreme Judicial Court holds, Conroy v. Toonay, 125 U. E. 568, that a breach of this oral agreement was a defense to the lessor's action for rent, and evidence of such agreement and its breach by the lessor was admissible in her action, though the original contract modified by the agreement was within the statute of frauds.

Risk from Simple Tool Used by Steam Fitters.

A pipe fitter was making a connection of a steam pipe to a radiator. The pipe wrench was worn and frequently slipped, and failed to hold its grip on the pipe. On one occasion when it slipped, the workman wrenched his back and the radiator fell upon and bruised him. The workman brought an action against his employer for damages, not under a workman's compensation act, but under the general principles of the common law. The Kansas Supreme Court holds, Ernst v. Chicago Great Western R. Co., 185 Pac. 1053, that the tool was a common and simple one in the workman's vocation, and that the rule as to assumption of risk of the ordinary hazards of his calling bars a recovery against his employer. This common law rule is that ordinarily an employer is not liable to his workman for injuries sustained in the use of a defective common tool, with which the workman is perfectly familiar, nor where neither the employer nor the employee contemplates any danger to the latter in the continued use of the defective tool.

Testing Water Heating Systems.

A contractor for the installation of a water heating system, after the installation was completed, to satisfy himself that the system would not leak, filled it with water and tried it out. He then left the water in the system of which fact the owner had no knowledge. Subsequently the water froze and damaged the system. It was held, Olesen v. Beckanstin, (Conn.) 107 Atl. 514, that the contractor was liable for the damage caused. The written contract was to put in a complete water heating system of a special kind and capacity for a certain sum, and then it stopped. It was held that it was proper to apply to the construction of the contract a custom of the trade that heating contractors draw off the water of the water heating systems after testing for leaks, unless the consent of the owner is obtained to leave it in or he is first notified. Such a custom did not vary the contract.

MODERN PRACTICE IN VAPOR HEATING

EDITOR'S NOTE: For the purpose of this series of articles, a vapor, vacuum, vapor-vacuum, vacuum-vapor, atmospheric, modulated or thermograde system of heating will be considered as any system in which the steam pressure ordinarily carried is practically at atmosphere or slightly below or in which the returns are open to the atmosphere and where no pump or other positive mechanical device is employed to pull back the returns.

XXIII—THE ECONOMY SYSTEM.

Out of the West comes a vapor heating system which, from the standpoint of simplicity, stands in a class almost by itself. It is known as the Economy System, and is manufactured by the Economy Vapor Heating Co., Omaha, Neb. The specialties were designed by Frank H. Shell, who is the president of the company.

In this system advantage is taken of the chimney flue to aid in venting the radiators. Its unique feature, however, is the absence of radiator return valves or traps. The radiators are tapped ½-in. for return connections, and eccentric bushings and union ells, used, both the air and condensation being carried along the return main to a main vapor valve in the basement.

A typical layout of the Economy system is shown in Fig. 1. As will be seen, the specialties used are limited to a main air and vacuum valve, shown at AV in Fig. 1; a thermostatic valve, shown at B; and a graduated radiator valve on each radiator. The air and vacuum valve is so constructed that when the fire is started or replenished, (with no vacuum in the system), the heated gases act on the escape pipe in the chimney, and the air in the system passes out through the main air and vacuum valve, without any pressure in the boiler.

The thermostatic valve (B), shown in detail in Fig. 2, is designed to remain open until all air is expelled from the system, which is immediately followed by vapor or steam coming into contact with the diaphragm. As soon as this occurs the diaphragm automatically closes the valve, preventing any waste of vapor or steam through the escape pipe. This valve remains shut until by the automatic operation of the damper regulator, the drafts are closed and the fire checked. There being now no pressure on the system, the valve B automatically opens and valve A automatically closes, preventing any air from entering the system.

This action seals the system against atmospheric pressure and as soon as condensation begins in the radiators, a vacuum is formed permitting the operation of the system at or below atmospheric pressure.

UNUSUAL CONSTRUCTION OF RADIATOR VALVE.

The Economy graduated radiator valve used with this system, is of unusual construction. With the purpose of making the valve steam and air tight, metallic washers are fitted at both top and bottom of the stem, and are held in position by a spiral spring, together with a metallic packing under the seating ring of the stem. The graduation of the valve is accomplished by means of a sleeve which is cast with the bonnet, perforated at regular intervals and having a cast aluminum plunger carrying a metal disc, perfectly fitting the inner sleeve and controlled by a non-conducting, indicating handle on top. With this disc, steam or vapor can only enter the radiator through the graduated port holes in the sleeve. Incidentally, one turn of the handle gives full opening of the valve.

Radiators of the water type are used with the Economy system, tapped ¾-in. for supply and ½-in., as already mentioned, for return connections. The manufacturers state that while extremely long radiators should be tapped for supply at one end and return at the other, they advocate, under ordinary conditions, taking the flow in and the return out of the same end, where possible. If radiator should short-circuit, they recommend the insertion of a pipe in the supply of the radiator, about 6 in. to 1 ft.

The manufacturers give some good advice regarding the importance of blowing off the boiler. On this point, they state:

1. It is important that the contractor who installs the heating, figures a valve and pipe for blowing off on top, same being left permanently.

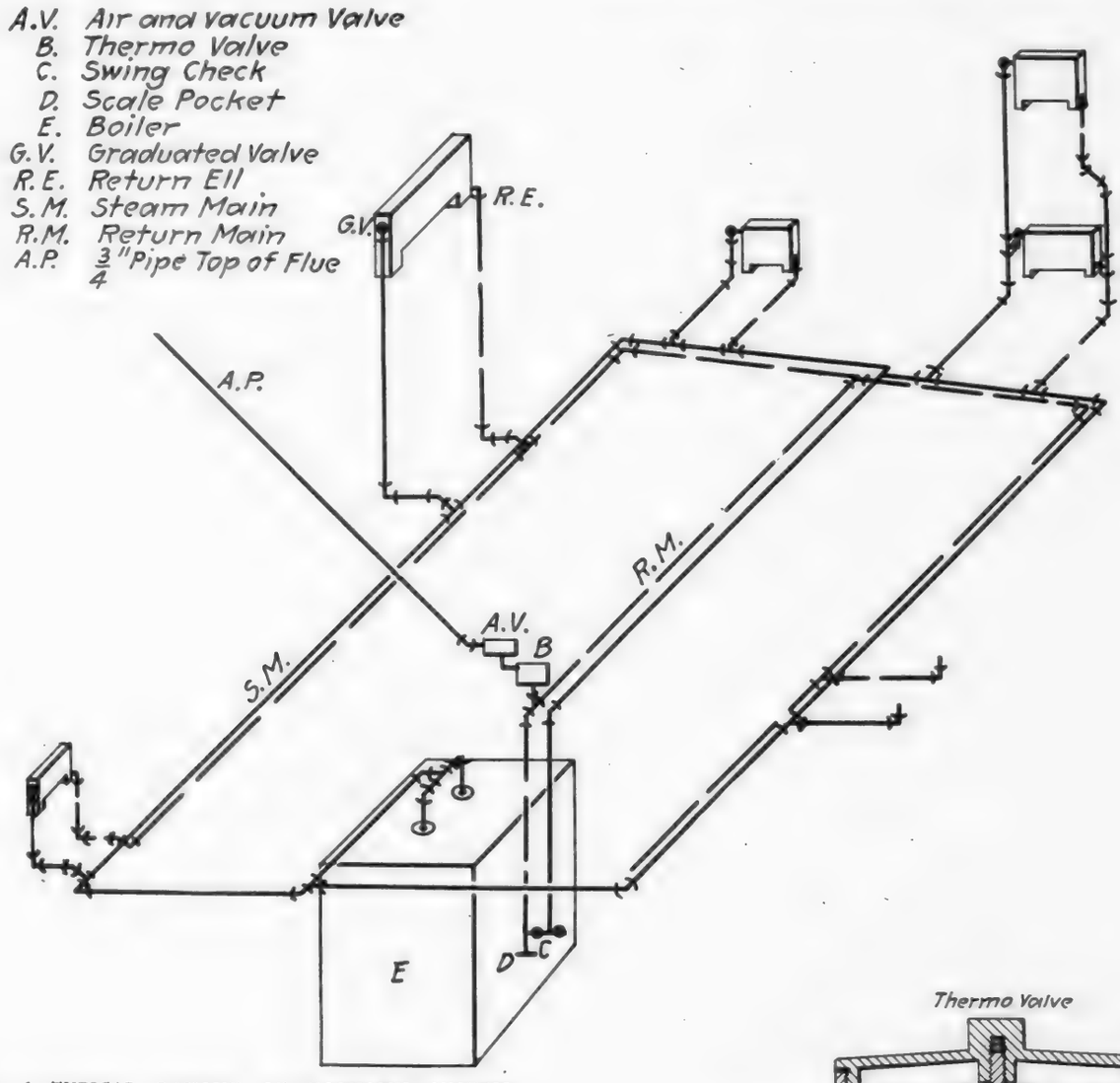


FIG. 1—TYPICAL LAYOUT OF ECONOMY SYSTEM.

2. Take a connection at top of boiler, put on a valve of one inch or larger and run same out the window or to a cellar drain.

3. Fill the boiler with water to top of glass, leaving valve at top of boiler open.

4. Fire up with wood or coal until the water flows down to about ½ in. in glass, shut valve on top of boiler, fill with water again, open valve and blow down again. Keep this up until water is clean and holds a steady water-line.

IMPORTANCE OF GOOD WATER-LINE.

The importance of having a good water-line is another point that the manufacturers emphasize. There should be enough difference in height between the piping and the water-line in the boiler to give sufficient head to allow the water to enter the boiler by gravity. The necessary difference depends upon the loss in pressure and that, it is added, depends upon so many things that no definite standard can be laid down. A job can be installed so well that there is hardly any loss in pressure in which case there will be no bad results from a close water-line, or it may be installed in such a manner as to require a great difference to overcome loss of pressure. For instance, the pipes may be too small or fitted with "jumpups," insufficient pitch in mains or branches, sags or pockets, dirt or greasy matter in fittings or boiler, or an excess of fittings. A difference of 18 in. will ordinarily give a good-water line.

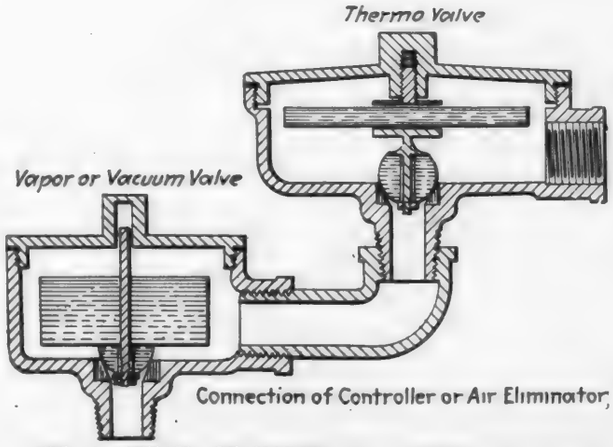


FIG. 2—DETAIL OF VAPOR AND THERMO VALVES.

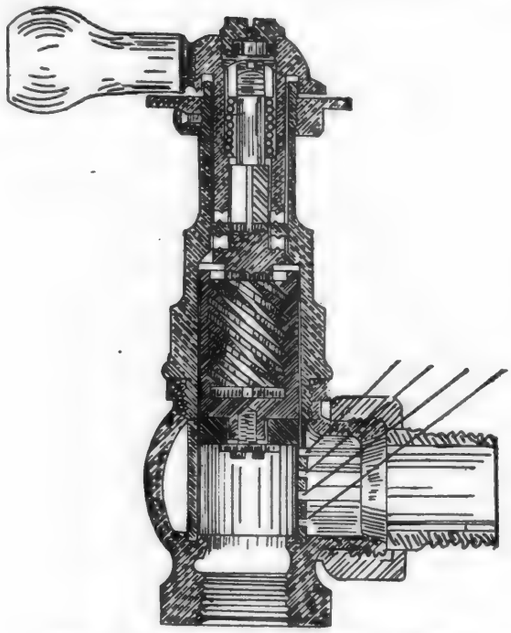


FIG. 3—ECONOMY RADIATOR VALVE.

Among other notes, based on considerable experience, are the following:

Use good hangers and line up pipes so that there are no sags to reduce the area of the pipe. Sags are always detrimental to a good working plant.

Supply and return mains should have a pitch of not less than 1 in. in 10 ft. Horizontal supply branches or laterals should have all the pitch possible, which will be ¼ in. to the foot. Shrinkage of joints or timbers in new buildings will often trap a branch having small pitch and make lots of trouble hard to adjust. Some steamfitters may object to our pitch but we know it is done with the best of results.

A tight job is expected from the fitter. The tighter the job the greater the vacuum and the longer it can be maintanied which means efficiency and economy.

Remember it is unnecessary to fill the fittings with paint or "dope" of any kind to install a tight job. Keep it out of the fittings and depend upon it only as a lubricant. Use it on the outside of threads if anywhere.

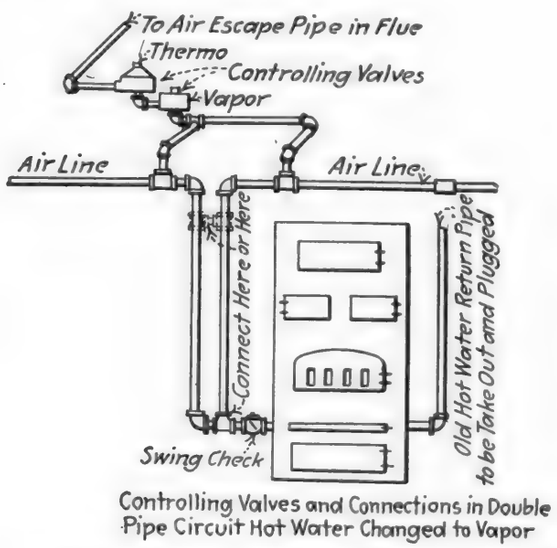

To Air Escape Pipe in Flue
Thermo
Controlling Valves
Vapor
Air Line
Air Line
Connect Here or Here
Old Hot Water Return Pipe to be Take Out and Plugged
Swing Check
Controlling Valves and Connections in Double Pipe Circuit Hot Water Changed to Vapor

FIG. 4—CONNECTIONS TO ADAPT WATER HEATING SYSTEM TO VAPOR.

CORRESPONDENCE

Returning Condensation from Institutional Buildings Covering a Large Area.

EDITOR HEATING AND VENTILATING MAGAZINE:

In your March edition, under the heading of "Wrinkles" appeared an article on returning condensation from institutional groups of buildings covering large areas. We wish to take exception with the writer of said article, who remarks that it presents by no means a simple problem.

We have in mind a trap return-line system which has been in operation for five years. The longest leg from the boiler house is about 2400 ft. to the feed-water heater, which is of the Cochrane open type. The static head on this return line from check valve to where the condensation enters the feed-water heater is about 5 ft. Each trap connects into said return line on a 45° angle with the flow, with a gate and check valve on the connection from each trap. This trap return system has about 100 traps of the open float or bucket type, non-return and three-valve tilt trap. A brief description of the types of traps involved follows:

The non-return trap receives condensation by gravity, discharging into a receptor or against a head in feet double the discharging pressure in pounds, approximately. The three-valve tilt trap is used as a lifting trap when the condensation pressure in pounds is less than the corresponding equivalent head in feet; or for removing condensation under a vacuum without breaking or losing the vacuum. This type of trap may also be used as a metering trap when equipped with a counting device, when by calibrating the trap the counter will at all times give the most accurate record of the amount of condensation handled.

The function of a trap is identical to that of a pump. The water flows to it by gravity until it overcomes the weight of the trap causing the valves to open and the pressure of steam on top of the water forces the water into the discharge line of trap and thence to return line and feed-water heater. There is a momentary rise in pressure at that point in the return line due to setting the water in said return line in motion. The time of discharge of traps varies on the different sizes and amount of condensation handled. The writer cannot see how a great pressure can be built up on a properly-designed return line of this kind where the line is open into a feed-water heater or receiver where the pressures are from atmosphere to possibly 5 lbs., which is usually carried on power plants where heating and process work is usually done.

Should someone shift a counterweight on a trap and cause it to lie open, or if you have a lot of leaky traps, then the trap on the farthest end of the line would have to buck the pressure caused by the traps that were out of kilter. You cannot very well blame a system of connections of this kind for the lack of attention of the operator, so why add a lot of pumps and receivers to perform the same function which the trap will do with less expenditure of power.

We all know that the kinetic energy of a pound of steam is somewhere around 7 to 8% of the total heat value of that pound, so why dissipate the other 92% or 93% by the use of a steam or motor-driven pump. With the traps this 92% or 93% is absorbed by the condensation and is returned back to the boilers by way of the heater.

A trap line system will handle condensation at higher temperatures than a pump. Where the exhaust steam can be all used in heating and process work, condensation from the return line should be returned to a receiver above the boiler and a direct-return trap should be installed to return the condensation back to the boiler, putting the water back into the boiler under higher temperatures, thereby lessening the strains and increasing the life of the boiler by having the return water enter the boiler nearer the temperature of steam at the pressure at which the boiler operates. C. A. L.

Maywood, Ill.

According to the correspondent, the system which he advocates is in actual use and doubtless is successful for the conditions under which it operates, though it would seem reasonable for the results to be otherwise. Certainly, if the correspondent is correctly interpreted, there are a varied assortment of traps using steam at high and low pressures; at least the three-valve tilt trap must use high-pressure steam if it is to operate at all.

Unless a return line is short and of large size, more in the nature of a header, and vented to the atmosphere within a reasonable distance by some such device as a receiver, it is not considered good practice to connect the discharge of high and low-pressure traps into the same long return line. A trap draining only low-pressure steam devices and discharging under the pressure of its own condensation is somewhat limited in the height to which it will lift, since not only must it operate against the resistance of a long return line, but also against the back-pressure of steam re-evaporated from the high-pressure condensation. If the total of these resistances exceed the effective pressure or pressure available at the inlet of the trap, the trap will not operate. Again, the discharge from a float trap is practically continuous, (since the height of the float and, therefore, the area of its outlet is proportional to the amount of water present) and at certain times it must operate against the intermittent discharge of the more positive high-pressure steam-operated traps. The pitch necessary in a long return line for gravity flow of condensate may make the cost of the trench very high and even when this is done there is usually quite a lift to the feed-water heater which must be set at a certain height above the boiler-feed pumps.

In the method which the correspondent advocates, every advantage possible to make the system more positive has been provided for, such as connecting each branch line into the return line on a 45° angle with the flow. The question may be asked, why use check valves if this method is reliable? Check valves will prevent a return flow, but at such times, due to the counter pressure, they hold up condensation back of them and also offer at all times a certain amount of resistance to the flow of condensate through them.

Speaking generally, the function of a trap is identical with that of a pump, though this applies in a less degree to traps which discharge under the pressure of their own condensation. The trap, in this case, does no real work to move the water, since this is done by the pressure of the condensation, which must always be greater than that in the trap discharge pipe. Such a trap must be located below the level of the apparatus to be drained, it has no suction power, and water must be delivered to the trap by pressure or gravity. Traps are not as positive as pumps, they have not the same force for their operation nor the same back-pressure against which they discharge, due to their varying distances from the source of supply and final discharge. It is more conservative to use a pump, and while this may be a matter of opinion, most engineers would prefer to use what is certain in its results than to make sole use of traps, even though the manufacturer might be willing to guarantee the results. Besides being more positive and more certain in its results, a pump will lift water to any height usually encountered, in work of this nature, the cost of trenching is less and also the cost of the piping, since the pipe and its covering may be of smaller size. The system may be readily extended from time to time and there is no danger of flooding the feed-water heater inasmuch as the discharge of the pumps can be regulated, whereas the discharge from numerous traps cannot, and it is possible that the greater portion of the latter may discharge at the same time. The return tank at each pump provides a storage reservoir of large capacity to take care of irregular volumes of condensation and allows only a solid body of water to flow to the main return line.

The cost of power for the occasional operation of pumps is fairly negligible and would amount to less than the increase of price of the larger size of return line and its covering. In the installation in mind, the return line is fully as long as that mentioned by the correspondent and there is only one pump for each cottage center. The pumps are located in basements and handle the condensation at high temperatures with considerable success, in particular since the flow to the pumps is by gravity. Each of the traps may be equipped with a counter to record the amount of condensation handled or, if desired, the pump may be similarly equipped.

Some of the variety of traps mentioned by the correspondent will pass steam along with the condensation but if the traps are given careful attention this loss may be reduced somewhat. Of course, if the steam so passed, together with that re-evaporated can all be used at all times without flooding the feed water heater or escaping through the back-pressure valve, which is doubtful, then there is no loss, nor is there a loss from the vent of each trap if this is connected into the return. However, there is a loss due to increased radiation from the long return line as caused by the passage of steam and while this may be but a small amount it may be as great a source of expense as the cost of intermittent operation of motor-driven pumps.

Disposal of Snow in City Streets.

EDITOR HEATING AND VENTILATING MAGAZINE:

Mr. William J. Baldwin's excellent article and illuminating diagram in the April issue of THE HEATING AND VENTILATING MAGAZINE will doubtless save many hours of useless thought and possibly some work and outlay on the tempting subject of getting rid of snow and ice in city streets by the process of melting. Mr. Baldwin wrote well as far as he went, but leaves the subject only partly developed in that he does not touch upon perhaps the equally important and difficult problem of disposal at a reasonable cost of water resulting from the melting method. In many cases, it might easily be found that the disposal of water would be the greatest drawback to clearing streets by a melting process.

While it appears doubtful whether any practicable method of changing snow and ice rapidly into water within permissible limits of cost can be devised, there is good reason for believing that removal of water resulting from a melting process would prove a not less costly operation. To simply melt snow and ice and allow resulting water to remain in the streets would, on the whole and in the long run, appear to be generally accomplishing but little, especially when contending with heavy snow falls, as those of the past winter. The resulting ice would prove so dangerous, obstructive and destructive and persistent that very likely the less resistant

snow, with mixed ice formation, would be preferred in spite of its greater bulk.

While a reasonably economical, but rather slow, method of melting could be developed, the handling of the water produced would inevitably involve considerable outlay. It would probably have to be disposed of as fast as made and by mechanical delivery into tank motor trucks that would convey it to the nearest sewer connection or opening. The requirements for clear streets in certain localities might warrant the cost of carrying out the necessary operations, but the question would remain of whether the situation would not more fully favor loading the snow and ice on motor trucks for hauling to some dumping place. The balance might turn on distance and difficulty in reaching the dumping point.

As a broad and general proposition, there does not appear to be anything in sight at present, except hauling away to a greater or less extent, according to local needs, the winter's accumulation of snow.

Rochester, N. Y. C. C. PECK.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

New York Chapter Installs New Officers.

Reports for the year and an outline of next season's work were presented at the May meeting of the New York Chapter, which was held at the Building Trades Club, May 17. This meeting was the concluding one of the season. The report of Secretary E. A. Scott showed a total membership of 100, with the chapter in a healthy financial condition.

J. I. Lyle spoke for the Research Bureau Fund Drive, calling attention to the growing importance and extent of the work. He also told of the efforts made by other institutions to secure the services of Director John W. Allen and of the successful efforts of the Research Bureau Committee to retain his services. Since the election of Dr. Allen as vice-president of the American Society of Mechanical Engineers, his appointment as chairman of that Society's Committee on Technical Education had given him unusual opportunities to visit various colleges and universities. As a result of these visits not only had he been instrumental in starting a number of additional researches, but had aroused an added interest in the subject of heating and ventilation which will mean a more prominent place for this course in many of the curricula. The fact that the Penn State College has a constant temperature room has made it possible to get an earlier start than had been anticipated on some of the bureau's investigations. Others who spoke on the drive were W. H. Carrier, W. L. Fleisher and R. A. Wolff, chairman of the chapter's Drive Committee.

The retiring president, Perry West, then installed the new officers after first expressing his appreciation of the support given him by the members during his term of office. The new president, W. L. Fleisher, outlined his policy for the coming year, urging the continuation of the work already undertaken. The meetings, he thought, should be outlined in advance and chairmen appointed for the year so that they would have plenty of time to make their arrangements. He made several specific recommendations in the way of meetings including:

1. A practical demonstration of the civic phase of industrial engineering, much on the order of a mock trial, to see how the suggestions that had been made in this connection would work out in practice.

2. Another Research Bureau meeting, to keep the members informed of the progress made and to obtain their suggestions.

3. Latest developments in the oil-fuel field, supplemented with stoker and economy sessions, as well as talks on gas heating.

4. Another meeting on the lines of that which discussed the Babson reports.

5. Arrangements for closer co-operation of chapters. Along this line he suggested that each chapter should select one of its best papers and send the author to present it before one or more of the other chapters, the subject to be an industrial problem of practical significance.

The other officers installed were A. S. Armagnac, vice-president, and F. C. Heiles, secretary.

Before adjourning the members were entertained by a running account, told by H. A. Erickson, of a trip to Japan and China in one of the Shipping Board's vessels. Mr. Erickson served as third assistant engineer on this vessel and had unusual opportunities to study engine-room ventilation. He said the ventilation facilities in this regard were deplorably inadequate and urged the society go more extensively into ship ventilation.

Manufacture of Wrought-Iron Pipe Discussed by Illinois Chapter.

A talk on the manufacture of wrought-iron pipe, illustrated by moving pictures, was featured at the May meeting of the Illinois Chapter, held at the Chicago Engineers' Club, May 10. The principal speaker was Mr. Geedes of the Reading Iron Company.

The conclusion of the chapter's last meeting for the season was made the occasion for a statement by President John Howatt that there had been an increase of about 40% in the chapter's membership during the past year.

F. W. Powers was appointed chairman of the nominating committee, and E. F. Capron, Chairman of the auditing committee.

The following were elected members of the chapter: Charles Butler, Frank F. Ferreria, E. G. Kohlbry, E. A. May, George H. McGregor, Ralph W. Yardley and Harry J. Lagodzinski (junior).

J. A. Cutler was the chairman of the committee in charge of the meeting.

Eastern Pennsylvania Chapter Hears Talk on Economizers.

W. F. Wurster, of the Green Fuel Economizer Company, spoke on "Economizers" at the April meeting of the Eastern Pennsylvania Chapter, held at the Engineers' Club, Philadelphia, April 8. Mr. Wurster told of the development of the economizer from the first machine built by Edward Green in 1845, which was made up of cast-iron tubes 4 in. in diameter and 9 ft. long, arranged in circular groups of 30 tubes. Difficulties with soot were quickly met with and the development of mechanical scrapers soon followed.

The speaker presented some interesting data on methods of proportioning the economizer, the most important factors of which were the temperature and quantity of gases available, the initial temperature and quantity of feed water and the available draft.

A number of curves were show indicating that the most satisfactory amount of economizer surface installed varies from 3 to 7 sq. ft. per boiler horsepower. It is important, said the speaker, that the items of feed-water temperature rise and final flue-gas temperature should balance with the items of loss in draft and cost of apparatus.

The discussion brought out the fact that cast-iron tubes are to be preferred for economizer surface, as they are not affected by corrosive action of water.

National Pipe and Supplies Association.

Authoritative statements on business conditions in the pipe and supplies trade were a feature of the eleventh annual convention of the National Pipe and Supplies Association, which was held in Chicago, May 10-11.

J. J. Kennedy of the National Tube Company gave a sidelight on the pipe situation by referring to the large needs of the oil fields for pipe. R. B. Flershem, of the American Radiator Company, emphasized the effect of strikes and other labor troubles, as did most of the other speakers. Deliveries are now 30 days in arrears. This situation, he felt, would grow worse, as the increase in the number of building permits meant a 25% to 35% increase in the demand. He expected the shortage in boilers and radiators to continue through 1920.

Former Senator Albert J. Beveridge was a speaker at the opening session, his subject being "Economic Conditions."

The report of Secretary George D. McIlvaine showed that the association now has 270 members.

In connection with the cost of doing business it was stated that this figure during 1919 was 19.53%, as compared with 19.62% in 1918. Many members reported a greater increase, bringing the present cost to 20.57%. As against this the volume of business done was in most cases nearly double.

The afternoon session closed with an address by the first president of the association, A. E. Ford, on "Fifty Years in Pipe and Supplies," in which he recounted the inflation period of 1873 and how it could be compared with the present situation. He expected to see a difficult financial period again but believed that with sufficient liquid assets American business would not suffer seriously.

On the second day of the convention addresses were made by Whiting Williams, of the Hydraulic Pressed Steel Company, on "What's on the Worker's Mind," and on "The Work and Possibilities of the Trade Extension Bureau," by Dixon C. Williams.

President George V. Denny, of Savannah, Ga.; was re-elected president. The other officers elected are: First vice-president, Guilford R. Adams, Rochester, N. Y.; second vice-president, W. E. Clow, Jr.; treasurer, George D. McIlvaine, Pittsburgh; directors (to fill three vacancies) W. P. Mars, Duluth; L. J. Merkel, Cincinnati and Murray D. Sales, Detroit.

National Warm Air Heating and Ventilating Association.

The added prestige of the National Warm Air Heating and Ventilating Association which has come to it since its inauguration of the important furnace research work at the University of Illinois, was reflected at its annual meeting in Cleveland, April 21, when an attendance of 125 furnace manufacturers was registered. A report of the research work done to date at the university was made by Professors A. C. Willard, and A. P. Kratz and V. S. Day of the research corps. Some of the data presented have already been published, but the presentation by those directly in charge of the researches proved most interesting and impressive.

Other important papers presented at the meeting were on "Humidity," by Henry P. Gale, of the Oneida Steel Pulley Co.; and on "Kersosene as a Fuel," by A. B. Frenier, of Chicago. Other speakers were B. G. Watson of Columbus, O., who spoke on "The General Proposition of Credits;" W. D. Cover, of Crestline, O., whose subject was "The Industrial Side of Our Industry;" and D. Rait Richardson, who spoke particularly of the work of the committees and of the increased cost of operation, emphasizing the fact that nearly everything that goes into a house has moved up far more in percentage than the heating apparatus. He urged that the members keep a very close watch on the cost of their finished products during the next few months.

The election of officers resulted as follows:

President, W. G. Wise, Akron, O. (re-elected); vice-president, John A. Howard, Dowagiac, Mich.; treasurer, I. L. Jones, Utica, N. Y.; secretary, Allen W. Williams, Columbus, O.; executive committee: D. Rait Richardson, New York; E. P. Miller, Marshalltown, Ia.; G. D. Wilkinson, Chicago; R. C. Cook, New York; and officers of the association.

NATIONAL DISTRICT HEATING ASSOCIATION

New Officers Elected at Annual Meeting in Chicago, May 25-27, 1920.

Vital problems in the central station heating industry, brought about by unprecedented rises in full costs, accompanied by the difficulty of obtaining adequate coal supplies, made the annual meeting of the National District Heating Association in Chicago, May 25-27, one of the most critical in its history. The seriousness of the situation had its effect on the attendance and on the reports of committees, although

J. L. HECHT.
President, National District Heating Association.

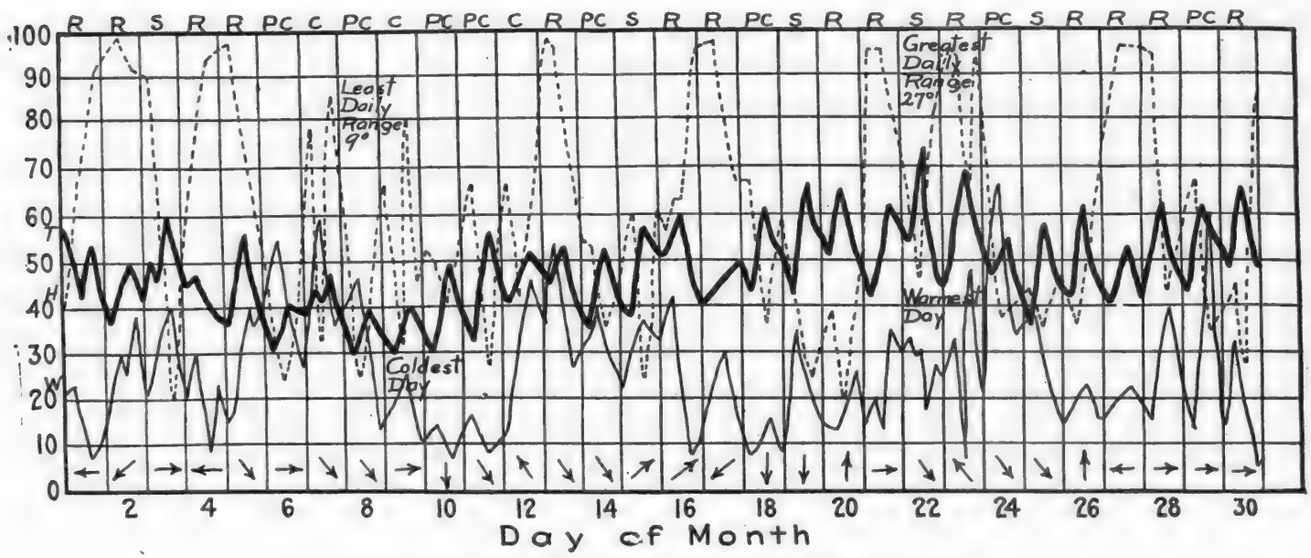
some of the committees, notably the meter committee and the station operating committee, had some important data to bring before the association.

A detailed report of the convention will appear in next month's issue..

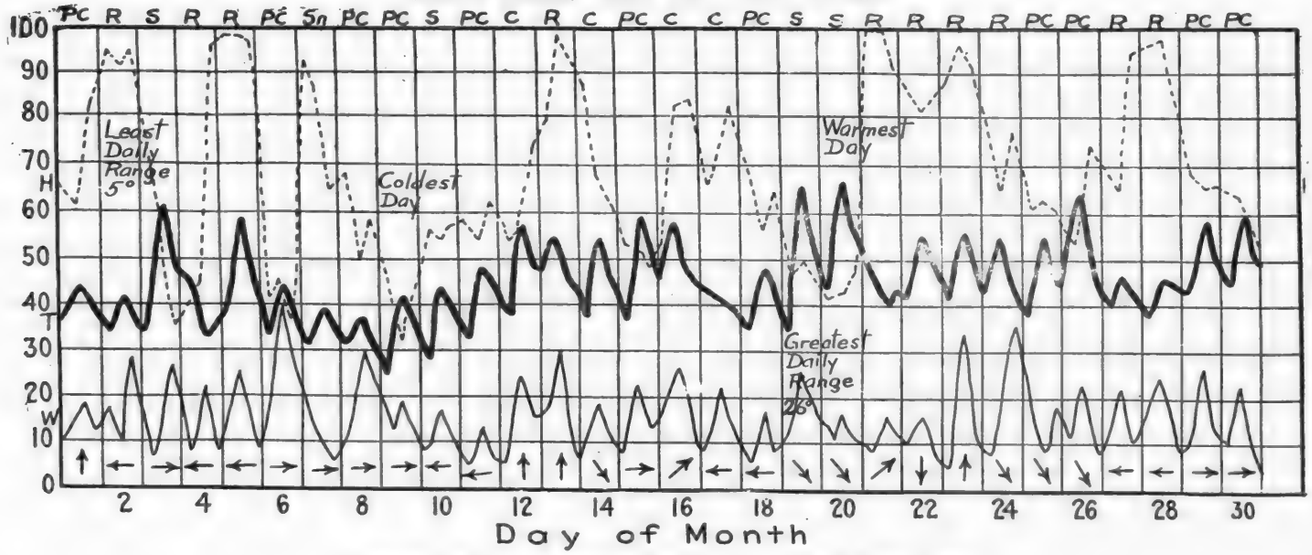
The new officers elected are: President, J. L. Hecht, Chicago; first vice-president, J. H. Walker, Detroit; second vice-president, E. L. Wilder, Rochester, N. Y.; third vice-president, W. G. Carlton, New York; secretary-treasurer, D. L. Gaskill, Greenville, O. Executive committee, the retiring president J. C. Hobbs, Pittsburgh; Fred B. Orr, Chicago, and F. A. Tucker, Danville. Ill.

THE WEATHER FOR APRIL, 1920

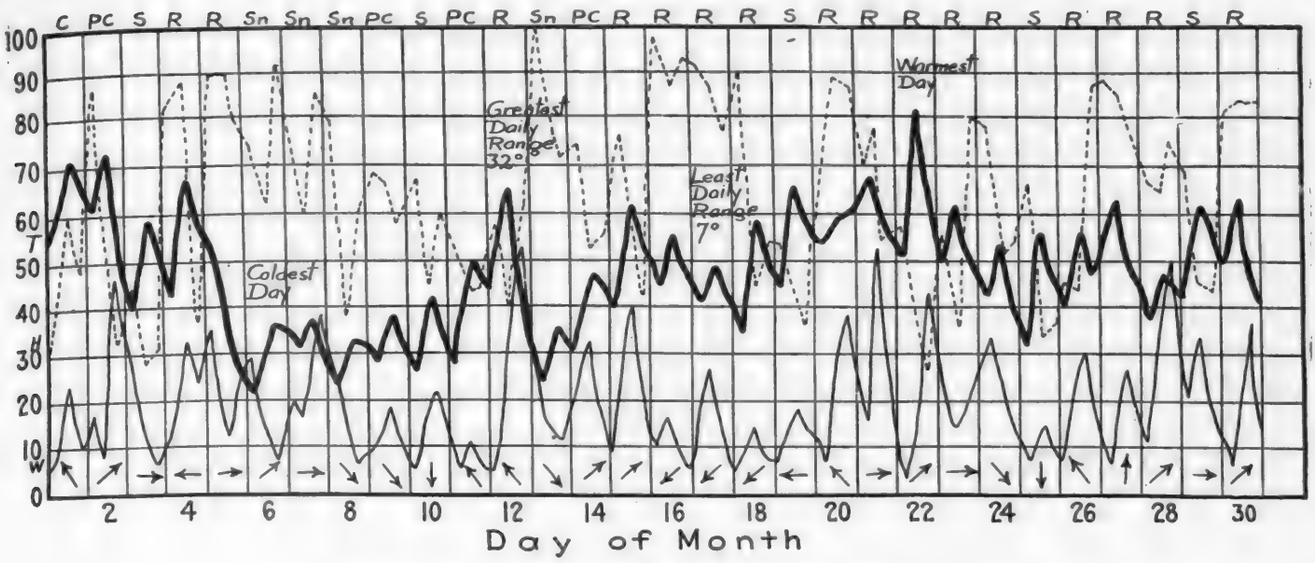
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F.	73	67	81	73	80
Date of highest temperature	22	20	22	22	21
Lowest temperature, degrees F.	30	26	22	20	22
Date of lowest temperature	9	9	6	6	5
Greatest daily range, degrees F.	27	30	32	30	28
Date of greatest daily range	22	19	12	2	1
Least daily range, degrees F.	9	5	7	4	6
Date of least daily range	8	2	17	26	18
Mean temp. for month, degrees F.	47.7	45	47	43	51.2
Normal mean temp. for month, deg. F.	48.1	45.3	51	45.9	56.1
Total rainfall, in.	4.44	5.68	4.42	4.71	3.43
Total snowfall, in.	Trace	2	1.5	6.4	0.2
Normal precipitation, this month, in.	3.3	3.55	2.9	2.88	3.52
Total wind movement, miles	14487	8784	10330	10723	11170
Average hourly wind velocity, miles	20.1	12.2	14.3	14.9	15.5
Prevailing direction of wind	N. W.	W.	S. W.	N. E.	N. W.
Number of clear days	5	4	2	6	9
Number of partly cloudy days	14	12	6	10	8
Number of cloudy days	11	14	22	14	13
Number of days on which rain fell	14	11	20	15	10
Number of days on which snow fell	4	4	7	1	1
Snow on ground at end of month, in.	None	None	None	None	None



RECORD OF THE WEATHER IN NEW YORK FOR APRIL, 1920.
(Relative Humidity Plotted from Hourly Readings.)



RECORD OF THE WEATHER IN BOSTON FOR APRIL, 1920.


C PC S R R Sn Sn Sn PC S PC R Sn PC R R R R S R R R R R S R R R S R
Greatest Daily Range 32°
Warmest Day
Least Daily Range 7°
Coldest Day
T
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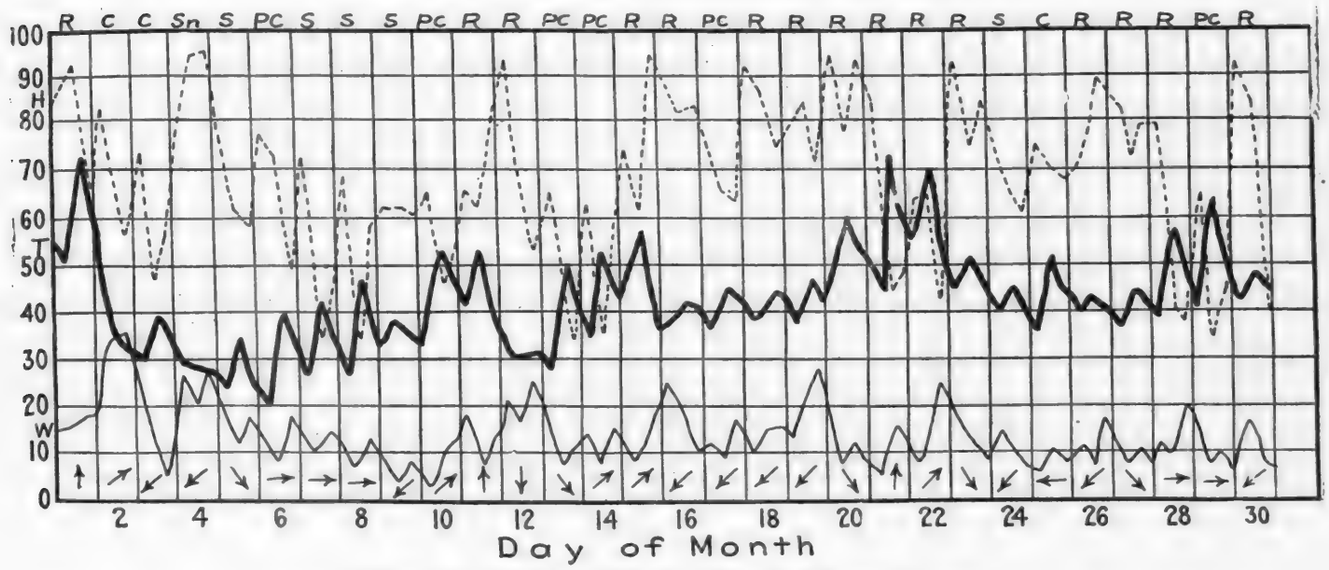
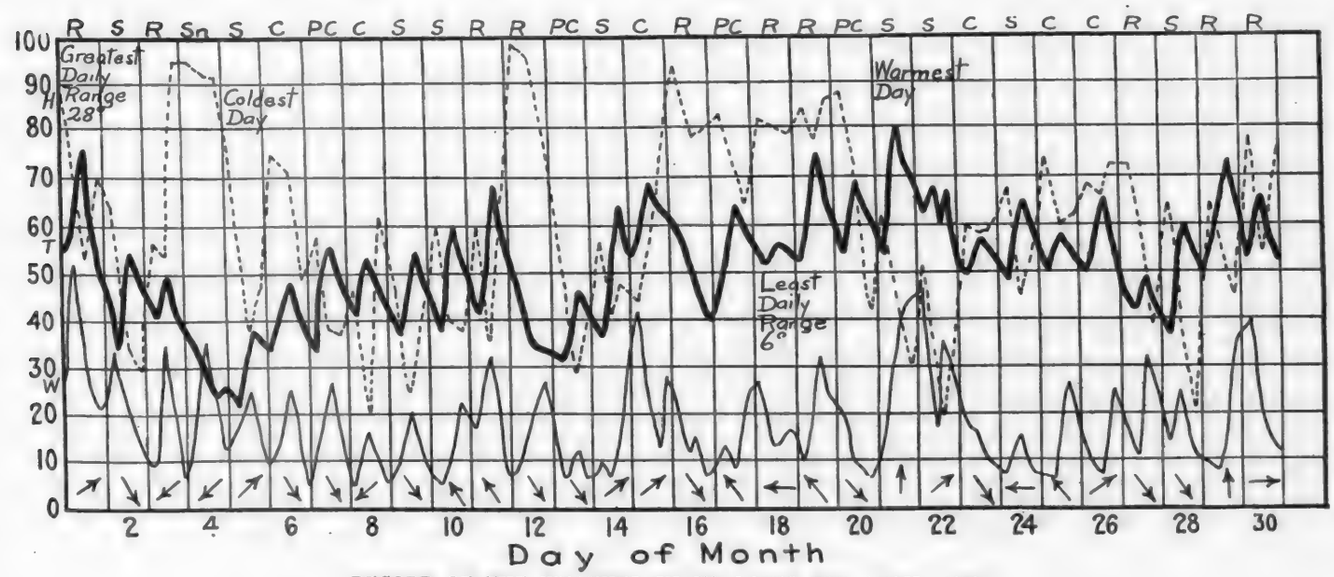
Day of Month

RECORD OF THE WEATHER IN PITTSBURGH FOR APRIL, 1920.



RECORD OF THE WEATHER IN CHICAGO FOR APRIL, 1920.


R S R Sn S C PC C S S R R PC S C R PC R R PC S S C S C C R S R R
Greatest Daily Range 28°
Coldest Day
Warmest Day
Least Daily Range 6°
T
H
W
Day of Month

RECORD OF THE WEATHER IN ST. LOUIS FOR APRIL, 1920.

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.
Heavy lines indicate temperature in degrees F.
Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings taken at 8 A. M., 12 M., and 8 P. M.
S—clear, P C—partly cloudy, C—cloudy, R—rain, Sn—snow.
Arrows fly with prevailing direction of wind.

NATIONAL TRADE EXTENSION BUREAU

Business-Building Suggestions for the Heating Contractor.

Among the material that has been prepared by the National Trade Extension Bureau for the use of the heating and plumbing contractors are letter-head material, lantern slides for movie house use, and plates and copy for newspaper advertising purposes. The bureau points out that it will help manufacturers and jobbers to cash in on their advertising department expense if they will send to the bureau, in as condensed a form as possible, an outline of what they have available for such uses, with exact information as to cost, if any, to the contractor. The bureau has already supplied much material and suggestions to the retail trade along these lines. The bureau is also desirous of obtaining from manufacturers suitable newspaper advertising copy that could be utilized by contractors.

New Form of "Cost-Plus" Contract.

A form of "cost-plus" contract has been drawn up by the National Trade Extension Bureau. The form specifically states that "the undersigned, agrees to furnish all of the above-described material and labor at actual cost of such material and labor to the undersigned, plus freight, drayage, trucking and———per cent. overhead, and in addition there shall be added to the aggregate cost of all of the above items———per cent. profit." Declines in the market are provided for as well as the method of payments which are to be made monthly on a basis of 95% of the total value of labor and materials furnished during the 30 days preceding, plus the overhead and profit percentages. The remaining 5% is to be paid on the completion of the contract.

This form, it is pointed out, will enable the contractor to present to his customer a "uniform printed contract" which the customer will take as the contract most generally used for work of this character. Under the conditions stated in the contract, compensation and liability insurance has been taken out of the overhead and is chargeable in the same manner as material and labor. It has been found that in many instances insurance is included in the overhead for the year. This practice, states the bureau, will prove satisfactory under normal conditions, if the contractor does about the same amount of work each year and employs the same number of workmen at the same wage. At this time, however, when wages have nearly doubled, compensation insurance has also increased in like proportion, because the rate has not been reduced, while the wages have advanced. This practice is characterized as profiteering of the boldest type, for these insurance companies do not pay the men any more per week for disability than they did previous to the war. However, while this condition exists, the bureau recommends that this insurance be extracted from the overhead and applied to the cost of labor per hour. In other words, if labor costs $44.00 per week, and the rate charged by the insurance company amounts to $2.00 per $100.00, the cost of labor should be $8.16 per day, which includes this insurance.

If the overhead is based on the premium paid last year, when labor cost $6.00 per day, the percentage of overhead will not be sufficient to meet the increased premium based on a rate of wage aggregating $8.00 per day.

T. E. B. Membership Monogram.

A monogram, illustrated herewith, has been issued by the National Trade Extension Bureau to be used by jobbers and manufacturers on their stationery and in advertising copy to indicate that

they are members of the bureau. Electrotypes of the monogram will be furnished free of charge to contributors, upon application, and are issued under a registered license.

Conference of Engineers in Washington, June 3-4.

A call to the engineering profession of the United States to meet in Washington, June 3-4, for an organizing conference has been issued by the Joint Conference Committee. This conference is being called for the purpose of effecting closer co-operation of local and national technical and allied organizations, to further the public welfare wherever technical knowledge and engineering training are involved, and to consider matters of common concern to these professions.

The resolution providing for the conference was unanimously passed January 23, 1920, at a joint meeting of the governing boards of the Founder Societies and of the American Society for Testing Materials, the trustees of the United Engineering Societies and members of the Engineering Council. It has been characterized as "the biggest item of news of its kind in the engineering history of this country."

New Method of Moistening Room Air.

It is, of course, well known that the outdoor air, in winter weather, has a small water-vapor content. When this air is drawn into steam-heated houses where the temperature is maintained at 70°, or above, it is easy to see how low the relative humidity becomes. Besides extracting moisture from the furniture, woodwork, etc., this combination of high temperature and low humidity, results in rapid evaporation of moisture from the bodies of human beings, causing the feeling of chilliness even at a high temperature of the surrounding air of the room. It should also be remembered that all living beings, plants as well as animals, are surrounded by a thin layer of air filled with vapor emanating from their own bodies. This air being a bad conductor of heat helps to preserve the body temperature within physiological limits. In the open air, exercise by producing bodily heat and increasing the insensible perspiration and thereby the density of the vapor-filled layer around the body neutralizes the low temperature and low humidity of cold air, or the addition of clothing must be made to retain the vapor layer around the animal body and its heat.

AMOUNT OF MOISTURE REQUIRED TO HUMIDIFY ROOM AIR.

It is not generally realized how much moisture is required in heated dwellings to bring the air up to the desired condition as to relative humidity. As a matter of fact, this proper amount is very large, far in excess of what has generally been considered necessary and far more than it is possible to secure through the use of water pans in contact with pipes and radiators. In dry, zero weather the amount of water required is probably in excess of 1 gal. per day per 1000 cu. ft. of room space. Moreover, it is necessary to provide for a variation in evaporation. The problem, it is stated, rests fundamentally on the fact that you must not only generate water vapor, as distinguished from steam which may condense as soon as it mingles with the colder, but the vapor must be diffused through the room by superheating it, as by causing it to impinge against the hot coils or pipes of the radiator above the evaporating pan, and thence sent out through the room in the currents of heated air before it condenses and is precipitated. In other words, simple generation of the water vapor is not enough. It must be expanded by additional heat supplied by the radiator.

HOW NEW METHOD ACCOMPLISHES DESIRED RESULTS.

In a new method of generating and diffusing water vapor into the atmosphere of rooms, which has been developed by J. Wright and W. H. Marshall, of Pleasantville, N. Y., and recently patented, the scheme provides for immersing the lower part of some of the steam carrying coils of a steam radiator, for example, or a portion of the steam supply pipe of the radiator, in a

receptacle of water beneath the radiator. The vapor arising from the contact of the water with these hot surfaces may be regulated in amount by the extent to which the water is allowed to cover these surfaces. As the vapor rises from beneath the radiator coils, it is borne up between and around them by the currents of hot air they generate and it is thrown out into the room atmosphere, the heat from the radiator preventing condensation of the vapor.

No extra supply of fuel is necessary, it is added, in using this method, the lower temperatures more than offsetting the heat required for evaporation.*

Inasmuch as the liberation of vapor sets free a large amount of heat, the size of the radiators, that is, the extent of the radiating surface presented by them, as calculated for dwellings, should be reduced correspondingly. This reduction, it is stated, amounts to 40% to 50% for each radiator supplied with the apparatus if it is expected to keep 45% to 55% of vapor in the room atmosphere by this means. These relations of moisture to heating surface are based on conditions existing in the usual dwelling. In order to provide an apparatus for regulating the amount of vapor in each room, independently of the amount in other rooms, and in order to provide one which can be easily cleansed of the sediment from the evaporation of the water, something a little better adapted to these requirements had to be devised than the one first employed. The final development of the apparatus is shown in the accompanying illustrations.

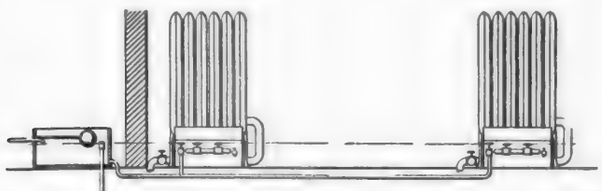


FIG. 1—HEATING SYSTEM EQUIPPED WITH VAPORIZERS.

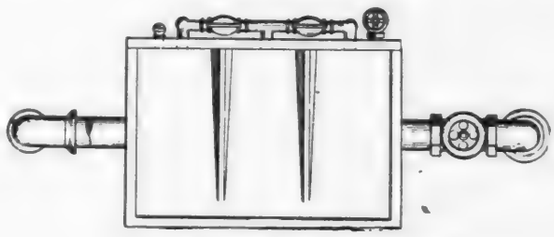


FIG. 2—PLAN OF VAPORIZER.

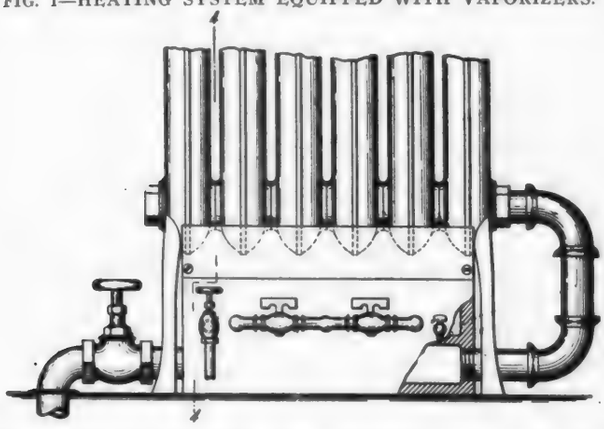


FIG. 3—SIDE ELEVATION OF RADIATOR AND VAPORIZER.

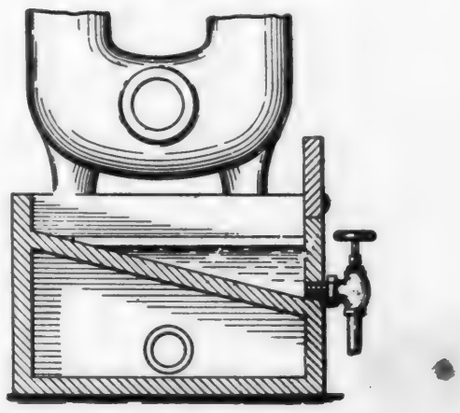


FIG. 4—SECTION OF FIG. 3 ON LINE 4-4.

CONSTRUCTION OF THE SYSTEM.

Fig. 1 shows a system embodying the invention and comprising two heaters and two vaporizers. Fig. 2 is a plan view of one of the vaporizers, with the heater removed. Fig. 3 is a side elevation partly broken away, showing the lower portion of a heater and the vaporizers located beneath the same. Fig. 4 is a section on the line 4—4, Fig. 3.

Referring to Fig. 1, it will be noted that castings are located below the radiators, each casting having in its upper portion an open compartment or container for water to be vaporized and in its lower portion a closet chamber for the heating medium supplied to the radiator. The bottom of the container has a slanting floor which separates the water in the water container from the chamber constituting a passage for the heating medium. The water containers, as shown, is provided with two barriers extending in the direction of the slant of the floor which divide it into three sections, as shown in Fig. 2. These sections are interconnected by piping provided with cocks whereby one or both of the other sections can be cut off from the left-hand section, so as to vary the extent of surface of the water in the container connected with the water supply. By this means the surafce of the water in one container can be varied independently of the water in the other containers.

The water supply to the radiators is shown at the left. Fig. 1. The water supply is connected with the two containers through cocks by which one or both of the containers can be entirely cut off.

Leading to one end of each chamber of the vaporizer is a pipe and leading from each other end is another pipe, the latter being connected to the respective radiators, each chamber, together with these pipes, constituting the means for supplying the heating medium to the radiator. Ordinary valves are provided on the inlet pipes for controlling the supply of such heating medium.

OPERATION OF THE SYSTEM.

In operation one or more of the compartments in the container are filled with water. The height of this water is determined by the height of the water in the tank which can be adjusted by means of the ball cock. On account of the slanting floor of the container, the surface of the water in the water container increases with the depth of the water therein and since, under given atmospheric and heat conditions heat vaporizes at a rate varying with its surface, a variation in the amount of water vaporized can be easily obtained. The level of the water and, as a consequence, its exposed surface, is fixed in a general way by the adjustment of the ball cock, and its surface in any container is thereafter varied independently of the other containers, as desired, by cutting off or adding one or more of the divisions of the water container by manipulation of the cocks.

The slanting floor of the container and its division into compartments allow for the common regulation of several vaporizers and the separate regulation of each vaporizer, providing simple means for varying the heated surfaces covered by the water and also the surface of the water exposed to the air and from which evaporation takes place, this evaporation varying with the surface of the water, other conditions being the same.

The water vapor rising from the container passes upward against an and around the sections or coils of the

* This is probably true if the heating system follows the usual run of keeping the rooms overheated in mild weather.

radiator, where is is superheated and expanded. By the means described the humidity of the air in a heated room, it is claimed, may be kept at any desired point.

Double sash is recommended for use with any system of humidifying as in zero weather the windows are apt to be clouded and partly covered with ice if the moisture is kept above 50%; this is not objectionable, however, unless it causes water to run from the glass to the window sill when the sun strikes it.

A practical point mentioned in connection with the use of this system, which has been tried out with good results during the past winter, is the means for cleaning the water receptacle. A door is provided which gives access to the interior of the receptacle. The pipe fitting should be provided at each extremity with a T, instead of an elbow, as shown. The removal of the screw plugs from these permits of their being quickly freed from obstruction.

New Idea for a Steam Trap.

A recent patent issued to Joseph F. Brightman, Rochester, N. Y., a well-known heating specialist, covers a type of steam trap which has many unique features. The trap as designed is the solution of an effort to obtain a thermostatic radiator trap for either gravity or vapor systems, with a slight differential between the radiator and the return, by providing a receiver into which the condensate would flow, the receiver to be intermittently filled with steam, whether the condensate was going back to the boiler under atmospheric, pressure or vacuum conditions in the heating system. All this to be accomplished without the use of check valves in either the return to the trap from the heating system or the return of the trap to the boiler.

In order to make such a design, it was necessary to provide for the operation of three valves through the use of an internal mechanism which would do away with the stuffing boxes necessary for a mechanism on the outside of the trap. It will be noted in the accompanying drawing (Fig. 1) that there are valves at the bottom and top of the trap. The valve at the bottom is shown closed and that at the top, open. Referring to Fig. 2, the third valve will be seen which is at the top and closed. The returns come back to the opening in the top (Fig. 1) and permit the condensate to collect in the receiver. As the water-level rises, the float also rises until a point is reached where the mechanism goes by the center of a spring tension. This spring causes the three valves to operate simultaneously with snap action, causing the valve at the bottom to open and the valve at the top to close. In Fig. 2, the valve shown closed, which is the steam supply valve, opens at the same time. This prevents steam from going back into the return and also prevents condensation from flowing to the trap.

While the valves are in this position the steam coming in the trap from the boiler equalizes the pressure in the receiver with that in the boiler, and the condensate flows back into the boiler. This continues until the float causes the reverse action of spring tension to take place. This reverse action of the valve puts the trap back into its original position. The steam which has flowed into the trap will condense, this condensation creating a vacuum which is transmitted to the return lines of the heating system.

It will be seen that this action takes place intermittently in proportion to the amount of work being done by the radiation in the heating system, and no condensate goes back to the boiler except when the receiver is filled and emptied. Each time this action takes place the vacuum created by this intermittent operation will provide a differential that is desired in the operation of a heating system. There is an opening provided in the top of the trap through which the air in the heating system is permitted to escape. It is purposed to use an automatic device that will permit air to escape and prevent steam from being lost, as well as to prevent air from getting back into the receiver.

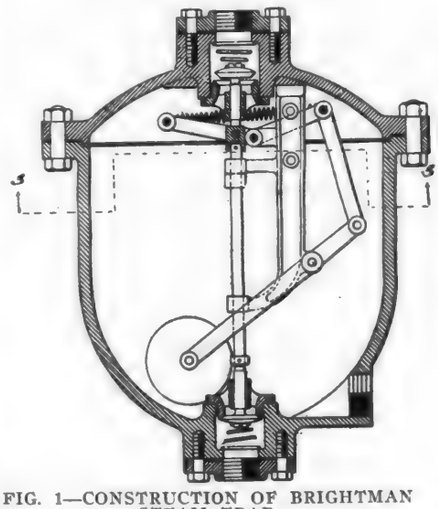


FIG. 1—CONSTRUCTION OF BRIGHTMAN STEAM TRAP.

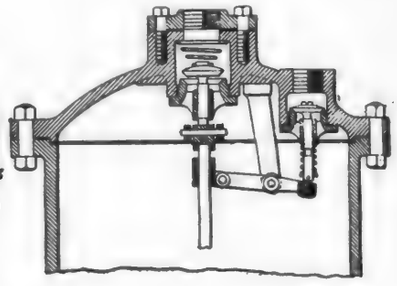
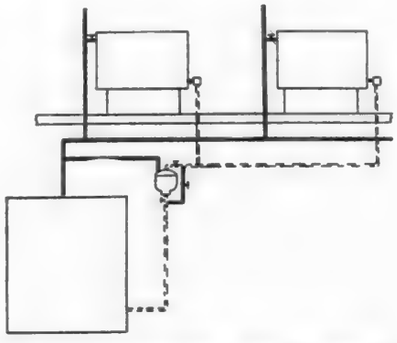


FIG. 2—VIEW OF TRAP SHOWING THIRD VALVE.



USE OF BRIGHTMAN STEAM TRAP IN HEATING SYSTEM.

New Device for Humidity Control.

Something new in the way of humidity control apparatus has been brought out by the Humidity Control Co., Indianapolis, Ind. It is designed especially for use in dry kilns. It consists of an adaptation of the self-contained thermostatic control elements, placed in opposition on a common steam valve. This valve is of the balanced, double-seated type. One of these thermostatic control devices is susceptible to the dry-bulb temperature of the room. The other is made susceptible to the wet-bulb temperature of the room by means of a silk wick, which is constantly tank below it. The result of this combination is to maintain a supply of steam to the kiln proportionate to the relative humidity desired.

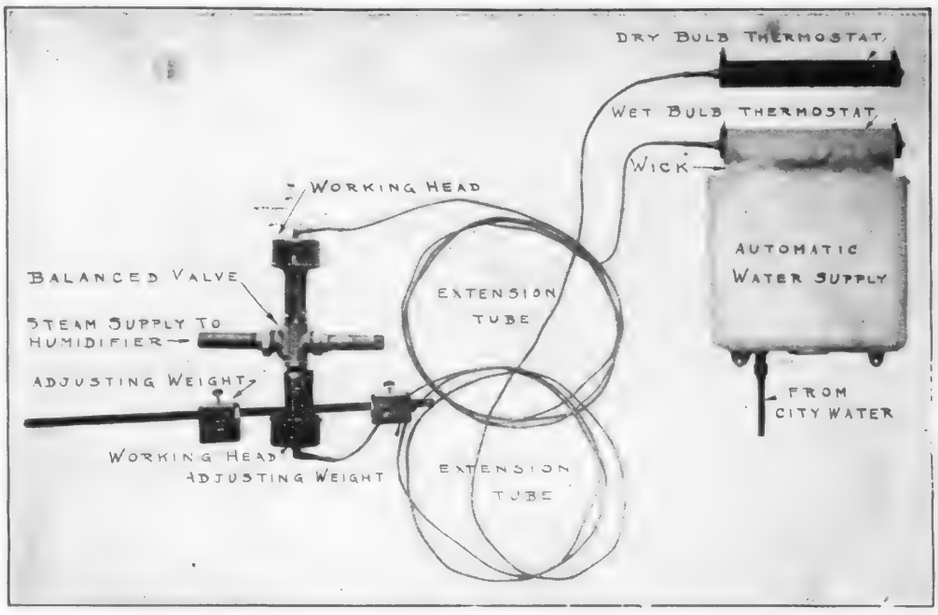
The purpose of the weights and lever shown is to enable the operator to adjust the operation of the valve to secure the degree of humidity desired.

To enable one to easily understand the principle upon which this device operates, let us suppose the weights and lever were entirely removed from the instrument. In this case, with no outside influence bearing upon the valve action, when the kiln is first put into operation the valve will remain wide open, because of the fact that the pressure in the dry-bulb thermostat is considerably higher than in the wet-bulb thermostat. The temperature of the wet-bulb thermostat is depressed by the constant evaporation of moisture from the silk wicks. Thus the valve will remain open until sufficient humidity has been put into the kiln to bring the air to a saturated condition—100%. When the air has reached this condition, there will be no further evaporation from the silk wicks; the temperature of the volatile liquid in the two thermostats will be the same; the

pressure on the working heads will be equal and balanced; the valve will close and the source of humidity be cut off.

The purpose of the weights and lever is to enable the operator (as stated above) to make adjustments which will close the valve at any humidity lower than 100%. By so adjusting the weights he may secure a closing of the valve while there is still a deficiency of moisture below saturation. In other words, the influence of the weight, added to the pressure generated in the wet-bulb thermostat, will balance the pressure generated in the dry-bulb thermostat.

The thermostatic elements used in the construction of this valve have been in practical use for some 15 years, on automatic temperature control devices. This assembly or adaptation of these elements has been in use for about one year, a number of installations being now in operation.



NEW HUMIDITY CONTROL DEVICE.

One of the advantages of this apparatus is that it guards against any mistake on the part of the operator in ventilating his kiln. For instance, if, in drying lumber, he should open his ventilators too wide, this would ordinarily cause a deficiency in the humidity of the kiln. The automatic humidity controller, however, will immediately open and make up any such deficiency. The humidity control device may be used on either compartment of progressive kilns.

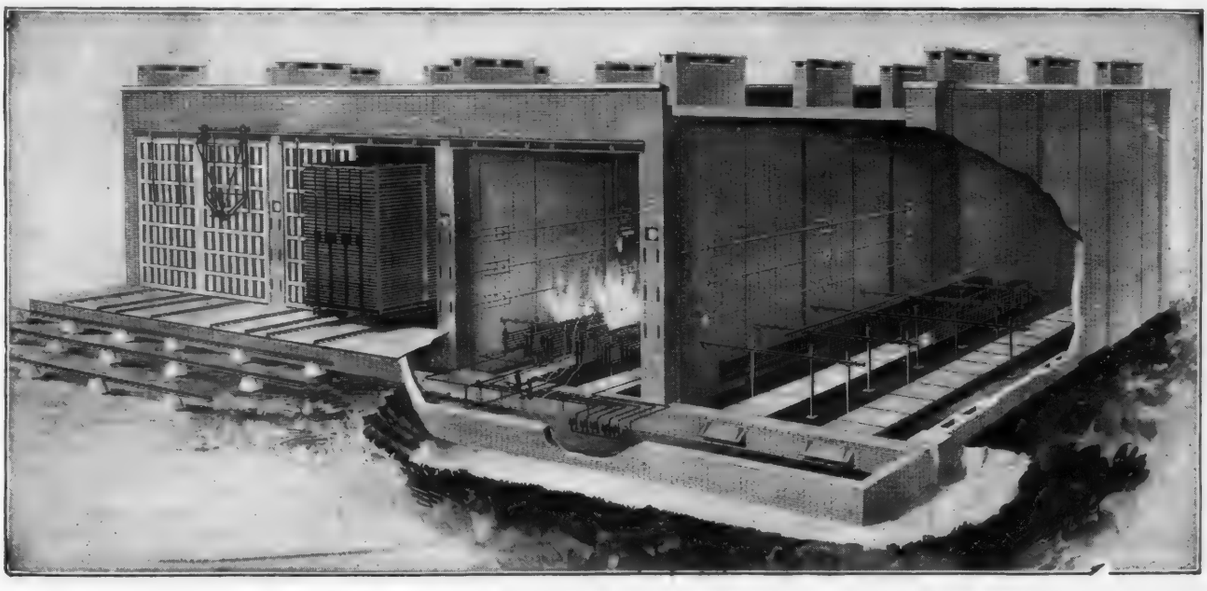
A New French Industrial Index.

Les Fiches Industrielles, devoted to industrial abstracts, and issued monthly in ten sections, is the title of a new French publication which covers the entire field of industry. With characteristic French thoroughness, the abstracts are arranged and numbered with great care and the division of the subjects into ten sections enables the reader to select with ease that section which pertains most closely to his own line of work. Each abstract is so printed that it can be cut out and pasted in a note book. They are all of the same standard size, 3½ x 5 in. Among the general subjects featured are metallurgy, mechanical construction, electrical equipment and industrial chemistry. A number of American publications are to be represented in the index, including THE HEATING AND VENTILATING MAGAZINE. *Les Fiches Industrielles* is published by the Societé d'Editions Commerciales et de Publicité Moderne, 21 Boulevard Bonne Nouvelle, Paris, and 51 Rue de l'Hotel de Ville, Lyons, France.

New Air Relief Arrangement for Vapor Heating

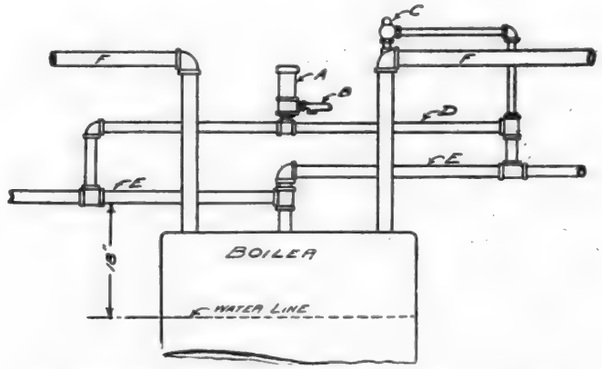
Something new in the way of an air relief attachment for vapor heating systems has been devised by the Gorton & Lidgerwood Co., New York, manufacturers of the Gorton patent self-feeding boilers and quarter-turn packless valves. This new air relief is not patented and is offered to the trade in the interest of better practice for this kind of work.

Referring to the accompanying illustration, the air accumulator (A) is made of a 2½ in. nipple, 10 in. long, a 2½ in. cap and a 2½-in. tee with the bottom outlet bushed to 1¼ in. and the side outlet bushed to ½ in. The air relief valve (B) is a ½-in. Sarco steam trap. The other devices used include a ¾-in. angle safety valve (C)



MODERN DRY KILN INSTALLATION WITH HUMIDITY CONTROL DEVICES.

which is used as an equalizing valve and which is made to blow at 8 oz. pressure; and air relief pipe (D) which connects the return mains with the air accumulator and must always be left uncovered. The lowest point in the return mains must not be less than 18 in. above the water-line of the boiler.



AIR RELIEF ARRANGEMENT FOR VAPOR HEATING.

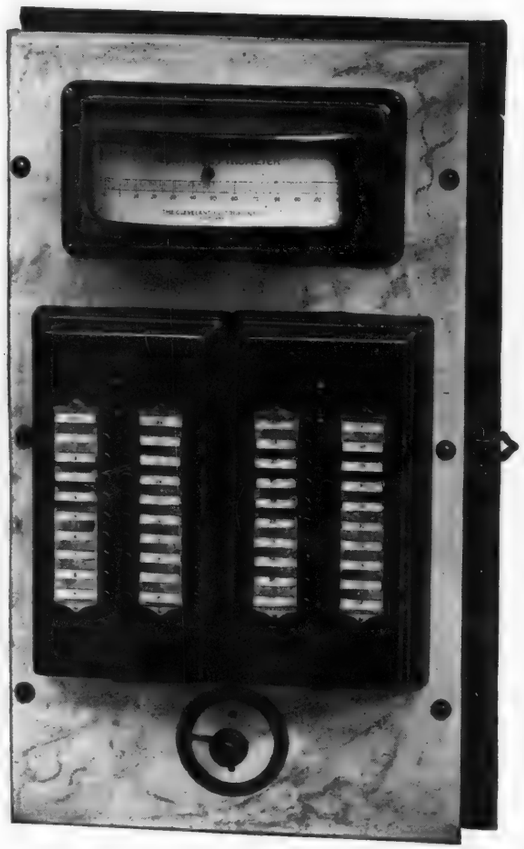
In operation the return mains are always open to the atmosphere through the air relief valve so that the vapor will flow freely to the radiators, with only a few ounces pressure to overcome friction in the pipes. Should the pressure go above 8 oz., the equalizing valve is designed to open, letting steam into the relief pipe, which will close the air-relief valve and equalize the pressure between the steam and return mains, thus maintaining a normal water-line. In heating large buildings two or more air relief valves can be used, as required.

Advantages of Electric Thermometers.

Noteworthy among the many scientific instruments developed recently for installation in buildings is the Cleveland electric thermometer, a temperature measuring instrument particularly designed for use in school rooms, apartments, hospitals, greenhouses, refrigerating plants and public buildings. The obvious utility of this device and the fact that it has been developed by a company that has won a reputation for the accuracy of its scientific instruments, are given as reasons for the rapid manner in which it has come into general use since it was introduced two or three years ago.

The Cleveland electric thermometer consists essentially of a switch-board and temperature-indicator which is installed in the office of the custodian and connected by wires to resistance elements suspended in the various rooms. By pressing any of several buttons the temperature of the room corresponding to the proper button is instantly indicated on the dial. It is not necessary to make calculations as the temperature is indicated just as plainly as on the ordinary house thermometer. The instruments are manufactured in several sizes and types, being described and illustrated in detail in a useful bulletin issued by the company (Bulletin No. 40).

Cleveland Electric Thermometer



SWITCHBOARD AND TEMPERATURE INDICATOR USED WITH CLEVELAND ELECTRIC THERMOMETER.

Proposed New Boiler Code for New York State

An amended boiler code relating to the construction, installation, inspection and maintenance of steam boilers has been drawn up by the New York State Industrial Commission. Public hearings on the code were scheduled for Buffalo, May 24; Syracuse, May 26; Rochester May 25; and New York City, May 28. Only boilers carrying a steam pressure of more than 15 lbs. to the square inch, are subject to the code.

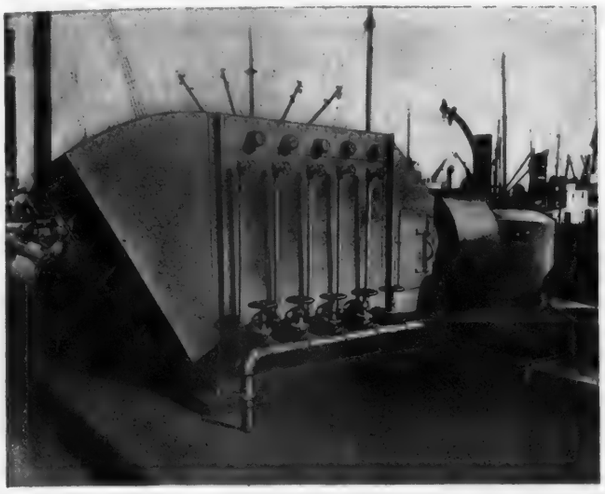
The last legislature amended the labor law limiting the application of the labor law and industrial code rules to boilers which carry a steam pressure of more than 15 lbs. (formerly not more than 10 lbs.), but extended jurisdiction to apply to all boilers operated in the State, except those subject to inspection by the Public Service Commission, the State Department of Public Works and the United States Government. Formerly the jurisdiction was limited to factories, mines, tunnels and quarries.

Rule 800, requiring an external inspection every six months, is amended to make such inspection annually. Rule 811 is a new section, requiring that the equipment of used boilers which are hereafter installed, shall be in accordance with the requirements for the equipment of new boilers. All other changes are the same as those made by the A. S. M. E. in the revision of its boiler code, except Paragraph 291, which is amended to make fusible plugs a mandatory requirement, instead of permissive. The New York State stamp is changed. The words, "Heating Surface in square feet" and "Year built" are to be required on the stamp and the words "Year put in service" are omitted.

STEAM TABLES—1920 EDITION have been issued by the Wheeler Condenser & Engineering Co., Carteret, N. Y. This is the fifth edition of this manual.

Trade Literature.

A CARGO OF PURE AIR is the descriptive title of a circular on the ventilating equipment of the S. S. St. Paul of the American line. Fresh air is supplied to the various quarters by a Hartmann balanced duplex system of ship ventilation, designed and installed by the Charles Hartmann Co., Brooklyn, N. Y. Provision is made for introducing the correct amount of fresh air into every assembly, lounge, dining, smoking and mess room. This fresh air is tempered to prevent chilling. From each room the foul air is drawn by balancing the volume of air exhausted with the fresh air brought in and by so locating the exhaust outlets that they do team work with the fresh air inlets. The prime units, consisting of fans, motors, tempering coils, etc., are placed on the sun deck and the air distributed to the various compartments through sheet metal ducts. Every fresh air supply and exhaust opening into the different compartments is supplied with a register and equipped with a regulating damper. The Charles Hartmann Company has specialized in steam ship ventilation and the circular includes an impressive list of such installations. Many engineers in the metropolitan district had an opportunity to inspect this system at the recent Marine Exposition in the Grand Central Palace, New York where an exhibit was made of model ship cabins, lounge and dining saloons equipped with the Hartmann system.



SUPPLY UNIT ON SUN DECK, SHOWING TEMPERING COIL WITH STEAM CONNECTIONS AND AIR INTAKE LOUVRES.

SUPPLY FAN AND EXHAUST FAN IN POSITION ON SUN DECK. MOTOR HOUSINGS AND WEATHER PROTECTION ARE SHOWN HERE.

GALVANIZED STEEL AIR DUCTS IN CABIN SPACE BETWEEN DECKS. THESE DUCTS WERE CONCEALED LATER BY THE INTERIOR CABINET WORK.

GALVANIZED STEEL DUCTS SHOWING CONNECTION BETWEEN TWO DECKS AND ALSO HORIZONTAL SECTION.

NEW COMPACT ATLAS OF THE WORLD, showing new and old boundaries and bringing out very clearly just what changes have come about as a result of the European War in the outlines of the various countries, has been published as a souvenir booklet by the Dahlquist Mfg. Co., Boston, Mass., which has the enviable reputation of being the largest manufacturer of hot water copper tanks in the United States, both light and heavy pressure. The last page of the pamphlet is devoted to the Massachusetts plumbing regulations covering the installation of pressure range boilers and it is stated that in complying with the requiremnts of this law, the test and working pressure and the capacity of all Dahlquist boilers will be stamped on each boiler and every boiler will be tested before leaving the company's factory. Size 4x7 in. Pp. 16.

WINDOW GUARDS of steel, brass and bronze, are shown in circular matter received from Howard & Morse, New York, manufacturers of the well-known Blackman and duplex cone fans. These window guards are furnished in a wide variety of styles and sizes for office and window protection, and for tool, storeroom and department divisions.

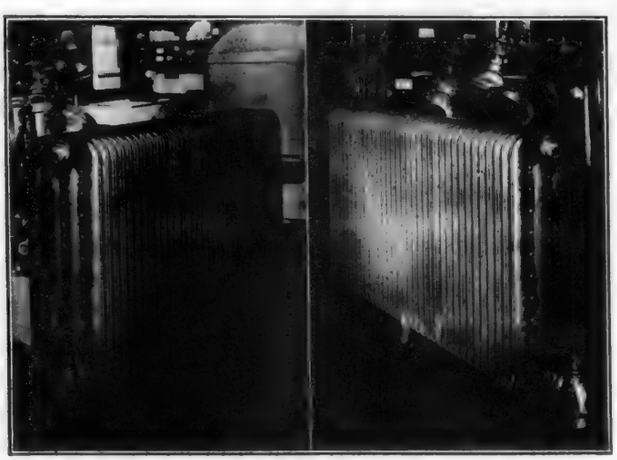
CLOW GASSTEAM RADIATORS, which are described as giving steam heat without the expense of a boiler, piping and chimney, are presented in a newly-issud circular received from James Clow & Sons, Chicago, Ill. In appearance the Clow gassteam radiator

resembles any other cast-iron steam radiator. In place of a boiler, however, each radiator is connected to a gas pipe and a Bunsen burner is placed under the radiator, entirely enclosed, in a cast-iron combustion box. Directly above the burner is the water chamber. An automatic regulator governs the gas supply. Gasteam radiators are furnished in several sizes and heights.

SIROCCO SERVICE for April, 1920, the periodical of the American Blower Co., Detroit, Mich., has an interesting article on "'Veterans' in Active Service," showing installations of ABC apparatus that have been in continuous operation for 15, 17 and 18 years, respectively. In another article views are shown of the Sirocco ventilating equipment in the Postum factory in Battle Creek, Mich. Under the title of "Even the Engines are Dry Nowadays," various uses are illustrated of the company's "New-Way" internal combustion engine which has a Sirocco fan attached to the inside of the flywheel, a housing built around the fan, with a duct carrying the blast directly to the cylinder and manifold. With this arrangement the engine requires no cooling water and a single engine gives from 2 to 5 H. P.

Feeding a 280-Sq. Ft. Radiator Through a 1½-in. Valve on a One-Pipe Steam System.

The advantage of a full-way opening in a steam valve is illustrated in the accompanying photograph of a 280 sq. ft. radiator in the heating and plumbing supply house of Burns Bros., Syracuse, N. Y., which is supplied, on a one-pipe system, by a 1½-in. Gorton quarter-turn packless valve. The photograph



280 SQ. FT. RADIATOR SUPPLIED BY 1½ IN. VALVE.

shows both ends of the radiator as installed, to demonstrate that it is on a one-pipe system. The company states that while this radiator condenses much steam, the opening in the plug in the valve is large enough to let the condensation pass back into the system without any hammering or noise resulting therefrom.

In another case, M. E. Lewis, a heating and piping contractor of Binghamton, N. Y., reports that about four years ago he installed in his office a 70-ft., 3-col. radiator, 38 in. high, using a 1-in. Gorton valve connected to a one-pipe system as an experiment. The radiator, he adds, has been working perfectly and as far as he can determine, is as efficient as when it was connected with a 1¼-in. angle radiator valve.

"About this time," writes Mr. Lewis, "I was called in to overhaul a one-pe steam plant in a six-family apartment. The system had only been installed a short time and was not working properly. I found that the corner rooms required 50-ft. radiators and only 25 ft. radiators were used, with 1-in. valves, and pipe sized accordingly. I told the owner about this type of valve and my experience with it in my office and was instructed to enlarge the radiators, using Gorton 1-in. valves. The job has been working three winters and is as satisfactory and efficient as any one-pipe job could be, and the owner has saved the expense of repiping."

Discontinuance of Working Conditions Service.

When the Working Conditions Service of the U. S. Department of Labor was organized, it was generally recognized that it could easily develop into one of the most important agencies of the government in the vital matters of industrial hygiene and medicine, labor administration and safety engineering.

It has been a matter of general regret that, owing to the failure of Congress to prove the necessary funds, this service was discontinued June 30, 1919. It is understood that one of the purposes of the federation of engineering societies will be to revive this Service, either as an adjunct of the Department of Labor or as a subdivision of the work of the proposed federation of engineering societies.

Death of Daniel Stern.

A pioneer editor and publisher in the heating and hardware trade passed away when Daniel Stern, publisher and proprietor of the *American Artisan and Hardware Record* died in Alton, Ill., May 4, while on a business trip. He had long been ill, but was considered on the road to recovery when he was suddenly stricken. He was 59 years old.

Mr. Stern was identified with the heating and hardware trade long before heating had become one of the recognized engineering professions. His paper, the *American Artisan and Hardware Record* was established in 1880 and grew from a small monthly to a large and influential weekly. Without a single break in the continuity of management it has been under the personal direction of Mr. Stern all of that time.

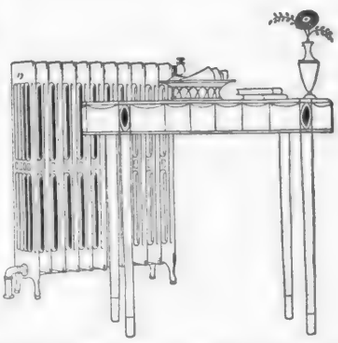
THE LATE DANIEL STERN

Editor and Publisher of the American Artisan and Hardware Record.

Mr. Stern's strong personality was not only reflected in his journal but had made him a widely-known figure throughout the trade and he was much sought after as a speaker at trade dinners and conventions.

It is announced that the *American Artisan and Harware Record* will continue publication without change of policy.

IRON AGE CATALOGUE OF AMERICAN EXPORTS, containing the catalogues of leading American manufacturers of engineering, railway, foundry and electrical equipment and supplies, iron and steel machinery and tools, hardware and cutlery, has just been published by the Iron Age Publishing Co., New York. It is intended for distribution in the civilized countries of the world. Size 9 x12 in. Pp. 1216.



CORTO

-the Radiator Classic

DESIGNED by Louis Courtot. For more than 200 years his people of the Jura, France, have created artistic forms in metal and have refined and beautified the common articles of the household.

Wherever elegance of proportion and refined lines are demanded to fit architecturally-chaste surroundings, this radiator classic, the CORTO, lends unusual distinction.

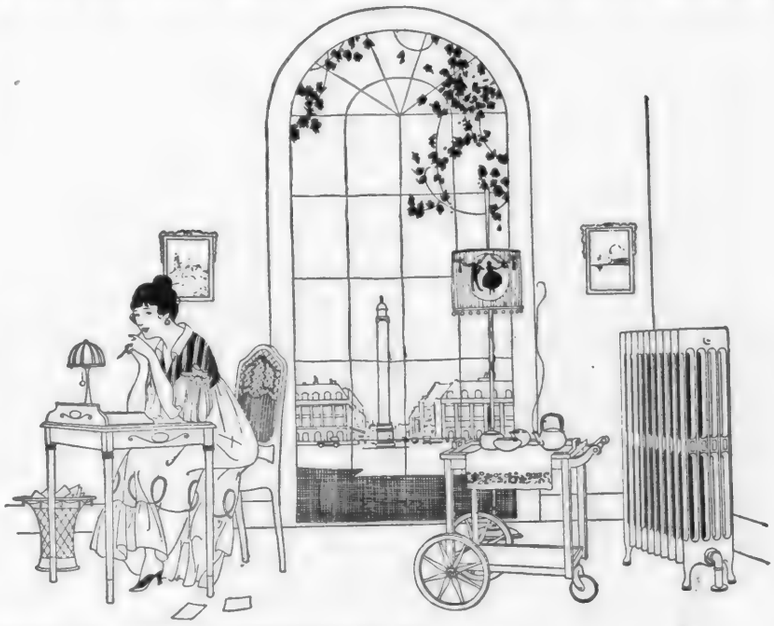
30% less space. 25% less weight

To those with whom utility is paramount, it need only be said that the CORTO, with its light, graceful tubes occupies 30% less floor space than any other type of radiator. The refinements reduce the weight one-quarter. There is far quicker circulation and venting. Utmost comfort is the result.

Our service obligation

We wish to give assurance that this new product will be attended by the same prompt and thorough service which has accompanied our goods in the past.

It will interest you to see the dainty Parisian catalog, "CORTO, the Radiator Classic." Inquiries cordially welcomed



Makers of IDEAL Boilers and AMERICAN Radiators

AMERICAN RADIATOR COMPANY

Sales Branches and Showrooms in All Large Cities

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

VAPOR HEATING

The Sterling System

(Concluded from Data Sheet No. 132-P.)

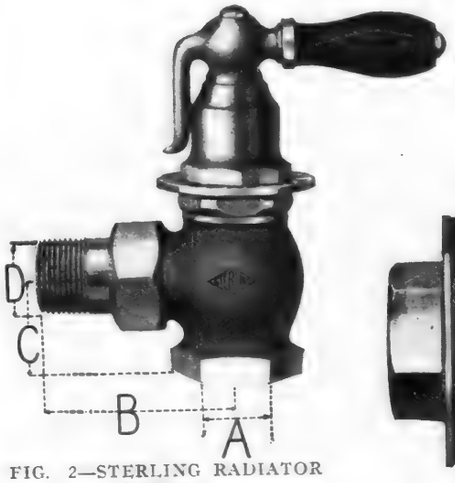


FIG. 2—STERLING RADIATOR VALVE.

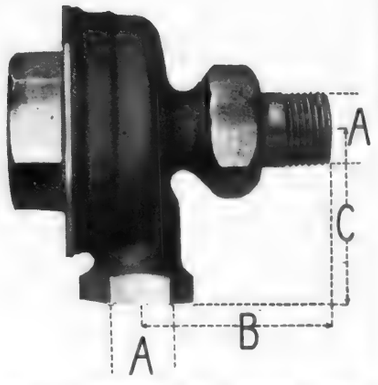


FIG. 3—STERLING RADIATOR TRAP.

ROUGHING-IN DIMENSIONS OF STERLING VALVES AND TRAPS.

No. of Valve	A	B	C	D	Capacity
A	¾	2⅜	1¼	½	Up to 70 ft.
B	1	2¾	1⅜	¾	70 to 150 ft.
C	1¼	3¼	1⅝	1	150 to 225 ft.

No. of Trap	A	B	C	D	Capacity
1	½	2⅛	1¾		Up to 75 ft.
2	½	2¼	1⅞		75 to 200 ft.
3	¾	2⅝	2½		200 to 500 ft.

NOTE—The above measurements are given in inches, capacities in square feet of radiation. For radiators 20 in. and lower in height and long radiators on coils use valve one size larger.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

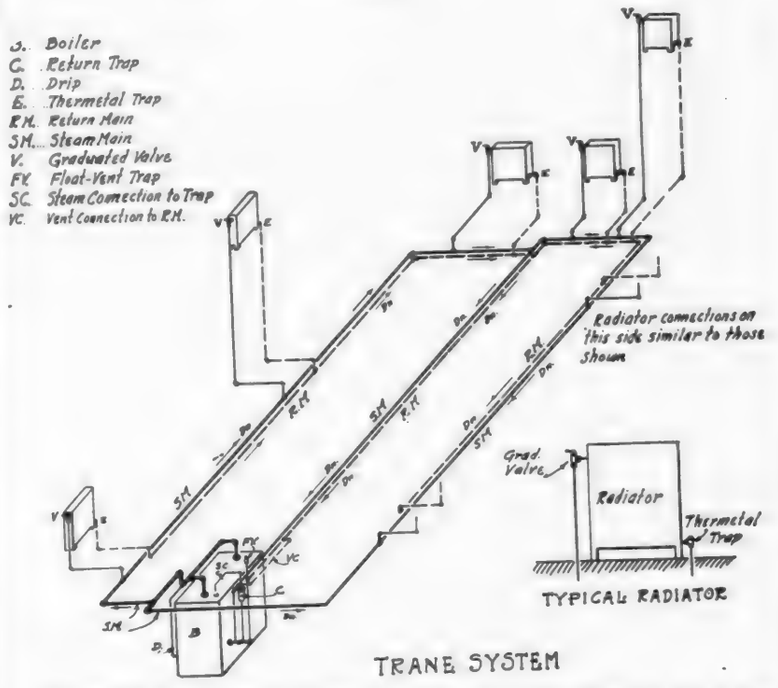
VAPOR HEATING.

The Trane System.

In the Trane System of vapor heating, developed by the Trane Co., La Crosse, Wis., use is made, in the larger installations, of the Trane Thermetal trap on the return end of the radiator. This trap is of such unique construction and has created such a stir in engineering circles as to give it special prominence among the radiator traps now on the market.

A typical layout of the Trane system is shown in Fig. 1. The specialties used consist of a vapor regulator for controlling the draft, a direct-return trap, a graduated vapor valve for the radiator inlets and the Thermetal valve already mentioned for the radiator return connection.

FIG. 1.



For smaller installations the company has a special return fitting for use in place of the Thermetal trap, and a receiver and air exhaust valve in place of the direct-return trap, for separating the air and returning the water of condensation to the boiler.

In installations where the Thermetal trap is used, the system is made safe, regardless of the pressure, through the direct-return trap (Fig 2). If, for any reason, due to faulty handling or mismanagement, the fire is allowed to burn too vigorously and a pressure is created on the system so that the water will not return by gravity, the water fills up the body of the direct-return trap, lifting the float and finally, when the float reaches the top, the steam valve in the top of the direct-return trap opens, forcing the water back into the boiler. The vent valve on top of the direct-return trap is also closed so that steam will not pass into the returns.

When the water is forced into the boiler, the float lowers and again operates the steam and vent valve, closing the steam valve and opening the vent valve, so as to equalize the pressure in the direct-return trap body with that of the return piping, thus allowing the water to again flow into the direct-return trap body by gravity. This operation is continuous so long as there is pressure on the boiler in excess of that required.

(*Continued on Data Sheet No. 132-T.*)

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

WATER HEATING, GRAVITY.

Down-Feed System

(Concluded from Data Sheet No. 133-D.)

The overhead flow main decreases in size as the branches are taken off and the return in basement increases correspondingly. See Table 1.

The return is run reversed as shown so that the flow is in the same direction as that of the overhead main and gives equal length of water travel for all radiators.

No air valves on the radiators will be required if the system is properly installed as the air is all removed through the vent line.

Only one valve is required for each radiator if the flow connection is made at the top of radiator and the return at the bottom at the opposite end.

TABLE 1.

Pipe Size In. Diam.	Radiation Sq. Ft. Main Riser	Main
1¼	200	150
1½	350	250
2	600	350
2½	1200	540
3	2000	900
3½	2500	1300
4	3500	1800
4½	4500	2400
5	6000	3200
6	10000	5000
7	12000	7200
8	15000	10000
10		13000
12		16000

DROP RISERS.

Pipe Size In. Diam.	Radiation, Sq. Ft. Single Riser	Double Riser
¾	25	50
1	80	120
1¼	120	200
1½	200	350
2	400	600
2½	750	1200
3	1000	2000

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

WATER HEATING—GRAVITY.

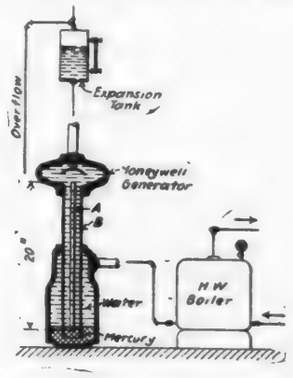
Closed Tank System.

The relation between hydrostatic head, gauge pressure and boiling point degrees F. for water is given in Table 1.

Theoretically it is possible to carry the water in the boiler, with an open-tank system, at a temperature corresponding to the heat as determined by the height of the expansion tank above the boiler. Practically it is not possible to carry a temperature in excess of 212° as the high temperature water will immediately rise into the expansion tank and boil.

In order to be able to increase the water temperature above 212° various devices have been employed. A common form of such apparatus is shown in Fig. 1.

In operation water entering the generator from the system will force the mercury up in the inner tube "A" until a head of 20 in. mercury corresponding to 10 lbs. pressure (240° F.) is established at which time the entrance to this tube will be uncovered by the mercury and water may enter same and pass up to the expansion tank.



Any excess of mercury above that required to just fill the tube "A" is returned by tube "B" to the reservoir in the base.

When the system cools off, water can flow back down tube "A" as soon as the mercury column drops in same, and the slight head of mercury existing at the outlet of this tube is easily overcome by the head of water in the expansion tank above.

The use of a pressure generator permits smaller radiators being used, as it is entirely possible to maintain a temperature as high as steam at 5 lbs. gauge.

Smaller mains and risers can be used with this system the difference between the temperature in the flow and return risers becomes greater with the open-tank systems, and, therefore, a greater actuating head exists.

Since a smaller amount of water is required with this arrangement the system is more sensitive in warming up and also in cooling off.

TABLE 1—RELATION BETWEEN HYDROSTATIC HEAD, PRESSURE AND BOILING POINT—(DEGS. F.).

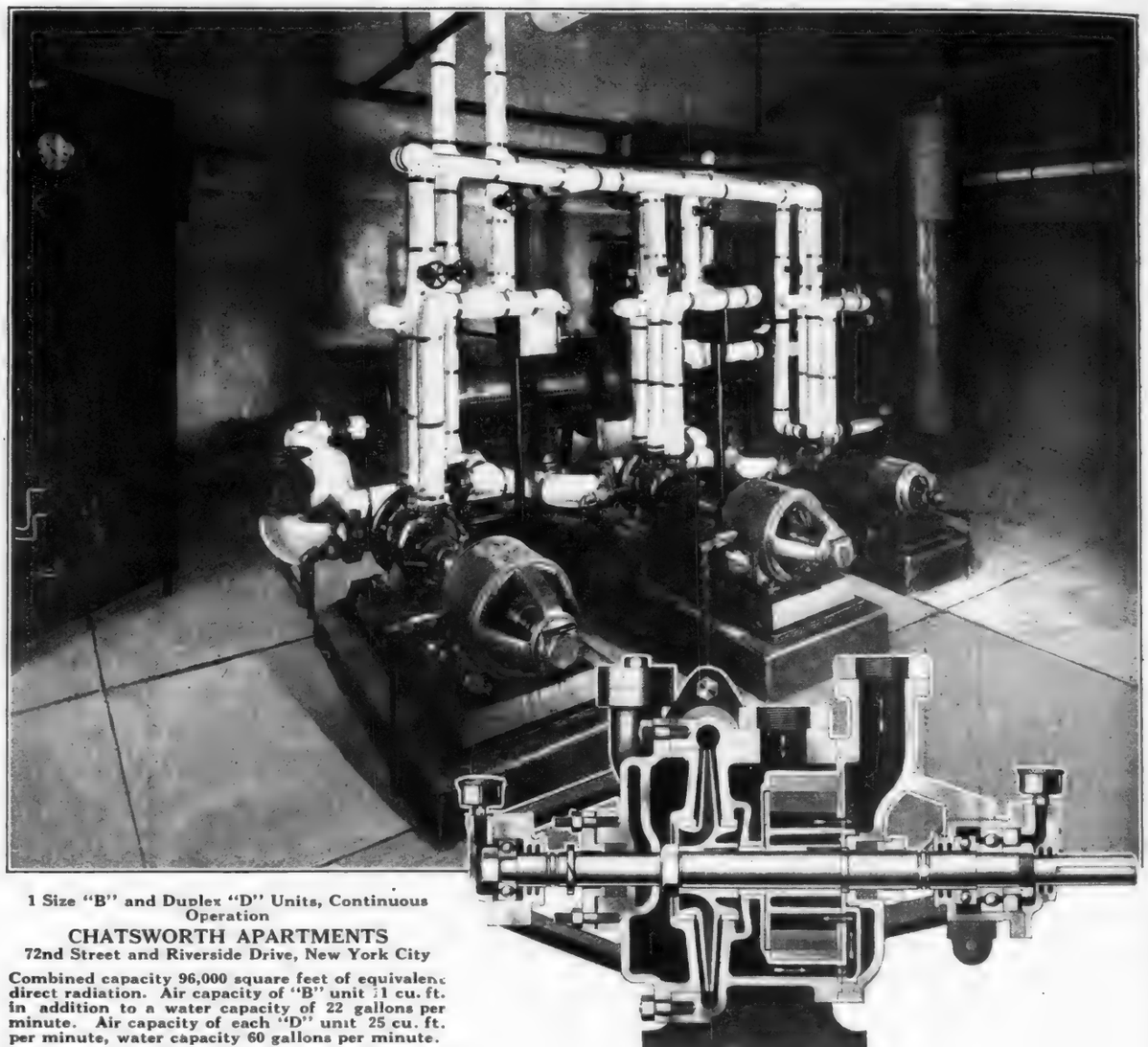
Head, Ft.	0	12	24	37	49	61	74	87	100
Boiling Point Deg. F.	212	227	239	250	259	268	274	281	287
Press. lbs. sq. in.	0	5	10	15	20	25	30	35	40

TABLE 2—SIZES OF RISERS FOR HONEYWELL SYSTEM.

Pipe Size In. Diam.	Capacity Radiation, Sq. Ft. 1st Floor	2nd Floor	3rd Floor
½	30	40	50
¾	75	100	125
1	75UP	100UP	125UP

WATER HEATING, GRAVITY—Closed Tank System. No. 133-F

EFFICIENT HEATING *demands the* JENNINGS PUMP



1 Size "B" and Duplex "D" Units, Continuous Operation

CHATSWORTH APARTMENTS

72nd Street and Riverside Drive, New York City

Combined capacity 96,000 square feet of equivalent direct radiation. Air capacity of "B" unit 11 cu. ft. in addition to a water capacity of 22 gallons per minute. Air capacity of each "D" unit 25 cu. ft. per minute, water capacity 60 gallons per minute. The motors are only 1½ H. P. for the "B" and 3 H. P. for the Duplex "D".

THE Jennings Pump consists of two independent turbine units, an air pump and a water pump. As each material is handled separately, the boiler pressure is against the water only. The air and vapor, approximately four-fifths of the volume handled, are delivered to atmosphere without back pressure. The saving in horse power is over fifty per cent.

Because of its compact design, this equipment can be installed in less than one-third the space necessary with other apparatus. All interior parts are bronze, supported on annular ball bearings mounted outside of casing. Moving parts revolve without contact.

There are many other reasons why the Jennings is being installed on practically all of the big jobs. Bulletin No. 8 gives them in detail. Write for it.

NASH ENGINEERING COMPANY

SO. NORWALK, CONN., U. S. A.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

Toronto, Ont.—At the recent convention of the Ontario Society of Domestic Sanitary and Heating Engineers an important conference was held of manufacturers and jobbers in which it was brought out that the manufacturers are overlooking one of their greatest sales forces in not educating the heating and plumbing contractors as salesmen for their products. Committees were appointed representing both the manufacturers and the contractors to further the movement.

New York.—In a recent review of the school building situation in New York, it was brought out that there are 539 school buildings in the greater city, valued at $160,000,000, although it would cost in excess of $300,000,000 to replace them to-day. It is claimed that their value is diminishing rapidly because of insufficient appropriations for repairs and upkeeps. It is stated that though the wear and tear on a school house is much greater than on an apartment house the amount appropriated annually for repairs and upkeep of New York's school plant has averaged less than 1% of the value. In the case of apartment houses, it is customary to spend at least 2% of their value in upkeep and repairs yearly. In 1918, the appropriation for upkeep and repairs was $1,414,000, in 1919, it was $926,000; this year it was $2,150,000, which was a compromise offered in place of the $8,000,000 that was needed.

Jamestown, N. Y.—At a special election in Jamestown the voters decided on an independent heating plant for the Jones General Hospital in that city. The buildings had previously been supplied with central station heat from the city's lighting plant on Steele Street. Increased demands on the power plant made it necessary to install new boilers and this, coupled with the fact that the line to the hospital is a long one and in bad repair, made it necessary to decide whether new underground conduits should be laid to carry superheated steam to the hospital or whether it was time to install a separate heating plant. As a result of the election, the Common Council is authorized to include an appropriation of $22,000 for the hospital heating plant in the 1920 budget. The specific items of construction are: Boiler house, 43 x 50 ft., including space for future refrigeration, $5,000; boiler settings, $4,000. concrete coal bunkers, 175 tons capacity, 12 x 24 ft. $6,000; radial brick chimney, 4 ft. internal diameter and 100 ft. high, $3,000; return system from the several buildings of the hospital site, together with piping, valves, supervision and all other requirements to complete improvements, $4,000. Some interesting phases of the situation which led to the change are given by John P. Moynihan, of Jamestown, who states:

"It has been found necessary in the past to carry a pressure of 60 lbs. at the Steele Street power house end of the present line leading to the hospital. To get this steam at 60 lbs., it has been the practice to 'step down'

HOWARD & MORSE

45 FULTON STREET, NEW YORK

VENTILATING ENGINEERS AND CONTRACTORS

MANUFACTURERS OF

Blackman

AND

Duplex Cone Fans

COMPLETE WITH

Motors, Duct Work and Wiring

Aligning, Rigging, Hoisting

GET OUR PRICES, PROFIT BY OUR EXPERIENCE OF LONG STANDING.

SEND FOR CATALOGUE.

the boiler pressure by means of a reducing valve. The steam enters the line at about 300° F. Under the new changes at the power house, if they 'step down' from 175 lbs. and 100° superheat to 60 lbs., the steam would have entered the line at 442° and this temperature would have caused the line to expand in proportion. It would also have required a different type of insulation."

Pittsburgh, Pa.—American Association of Engineers, Pittsburgh Chapter, has voted to expel one of its members because of his membership in a draftsmen's union. It was claimed that such a member could not possibly live up to the ideals of the association in the way of co-operation between employer and employee.

Cleveland Engineering Institute, which is carrying on a correspondence course in heating and ventilation engineering, has moved into new quarters at 8120 Euclid Avenue, Cleveland, O. It is announced that the advisory board is composed of Dr. E. Vernon Hill, president of the American Society of Heating and Ventilating Engineers; M. William Ehrlich, New York; James B. Lund, Chicago; Carleton F. Tweed, Minneapolis; and George W. Roberts, director of instruction. H. Carleton Hewitt is the business manager of the institute.

Heating and Piping Contractors' Boston Association elected the following officers at its recent annual meeting and dinner at Young's Hotel, Boston, April 13: President, J. W. Woodward, Lynch & Woodward; vice-president, Ralph S. Franklin, A. B. Franklin, Inc.; treasurer, Fuller C. Scofield, Scofield, Campbell & Co.; sceretary, C. W. Sisson. Directors: H. E. Barber, Barber Co.; H. E. Whitten, H. E. Whitten Co.; T. A. Ridder, T. A. Ridder Co.. P. J. McMurrer, the McMurrer Co.; John P. Gallivan, Isaac Coffin Co.; and Elmer L. Sollis, Power & Ventilating Co.

April Building Operations, according to the F. W. Dodge Company's

THE AIR YOU BREATHE SHOULD BE AS PURE AS THE WATER YOU DRINK

AT WORK RESTAURANT AT HOME

Ventilation in offices and factories will prevent that afternoon let down. Restaurants can increase patronage by removing cooking odors and heat. At home the lady of the house will find that correct ventilation makes kitchen work a pleasure.

ILG "Self Cooled Motor" Propeller Fans are serving thousands of users satisfactorily in every line of industry. Contractors and dealers will find a growing demand for "ILG" apparatus. Send for literature and discounts.

ILG ELECTRIC VENTILATING CO., 158 Whiting St., Chicago, Ill.

Branches in all large cities

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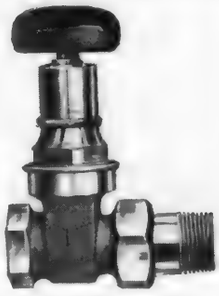
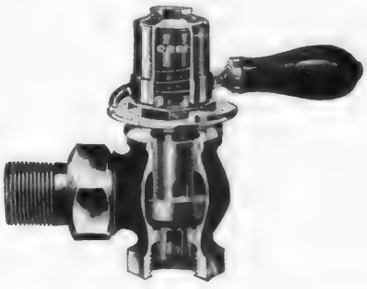
DOLE
PACKLESS
RADIATOR
VALVES



Insure Satisfaction

A Valve for Every System



Write for Catalogue and Discounts

The Dole Valve Company
208 North Wells St. CHICAGO

Co-operation

THE story of Jenkins Plumbing and Heating Valves is being told to present and prospective home owners.

Liberal use of space in *House and Garden, Country Life, House Beautiful* and color advertisements in the *Literary Digest* serves to constantly remind the consumer of the advantages of *Jenkins* installations.

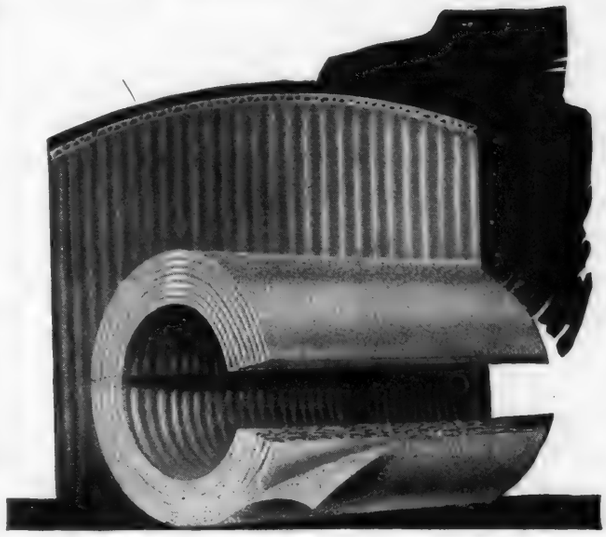
You can install Jenkins Valves with confidence in their satisfactory performance—for each Jenkins Valve is made for the maximum service, not merely for the average. Their construction is backed by over fifty-five years practical manufacturing experience.

Know genuine Jenkins Valves by the Jenkins "Diamond Mark"—cast on the body of every valve.

JENKINS BROS.

New York Chicago Washington Pittsburgh
Philadelphia Boston St. Louis San Francisco
Montreal London Havana

Jenkins Valves
2154-J



Asbestocel—

a combination of strength and efficiency

JOHNS-MANVILLE Asbestocel Sectional Pipe Insulation is a *real* insulation for medium and low pressure steam and heating pipes. It is composed of alternate layers of plain and corrugated asbestos felt in cylindrical form, with the corrugations running *around* the pipe instead of lengthwise.

This construction is the best possible application of the small "dead air" principle because of the short closed loops.

Heated air cannot flow lengthwise through Asbestocel

And because Johns-Manville Asbestocel is built on the principle of an arch formed by many small arches, it is stronger, more durable and retains its initial efficiency longer than the ordinary "air cell" type of "covering." It is designed so as not to be injured by vibration, rough usage or long shipments.

Johns-Manville Asbestocel is also made in flexible roll form for hot air pipes, heaters, etc.

Either form of Asbestocel will save a much larger percentage of the heat than ordinary "coverings." Moreover, Johns-Manville Asbestocel is a permanent investment; this heat saving will go on indefinitely because of the long service Asbestocel gives.

Send for the booklet

H. W. Johns-Manville Co.
296 Madison Ave., N. Y. City
10 Factories
Branches in 63 Large Cities
For Canada:
Canadian Johns-Manville Co., Ltd.
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Through—
Asbestos
and its allied products
JOHNS-MANVILLE
Serves in Conservation
Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
POWER PLANT MATERIALS

review of building activity, show that residential building, after lagging behind for some months, has resumed the place of prime importance over all other classes of construction. The total amount of contracts awarded was $334,007,000, a slight increase over the March figures. Analysis of the April figures show that $103,743,000, or 31%, was for residential buildings; $65,498,000, or 20%, for public works and utilities; $62,181,000 or 19%, was for industrial buildings; and $57,115,000, or 15%, was for business buildings. During April contemplated work was reported amounting to $445,053,000. In New England, there was a slight falling off from the March figures, while in the New York district, the amount of the April building contracts, $87,741,000, was an increase of 31% over the March total, and three times the figures for April, 1919. In Philadelphia, Baltimore and Washington, the activity about equalled that of March, but was 81% greater than in April, 1919. The same was true of the Pittsburgh district, while in the Central West, the increase over March and over April, 1919, was slight. In the Northwest, the amount of the building contracts was about the same as for March, but were more than double those for April, 1919.

Pertinent Facts and Figures about New York's building operations are given in a statement by the statistical department of the F. W. Dodge Co., New York. They show, among other things, that contracts were let in Greater New York during 1919 amounting to $279,551,000. Of this amount 48% or $133,764,530, was spent for housing accommodations, which, it is added, was not enough. In the first four months of 1920, contracts were let in the same territory to the amount of $119,455,050. The amount apportioned to housing was $38,602,400, or 32% of the total. This, it is claimed, show that the housing program has fallen behind the general building program. Contracts let for apartments, dwellings, hotels and dormitories in January of this year amounted to $6,581,500. During the same month the money spent on theatre tickets in New York City amounted to $7,838,914, according to the report of the Collector of Internal Revenue. In February, contracts for apartments, dwellings, hotels and dormitories amounted to $4,353,500. Theatre admissions in February came to $6,956,267. The conclusion is reached that the people of New York have got to put more money into apartments and houses. Rents will remain high as long as the demand for houses exceeds the supply.

Chamber of Commerce of the United States, at its eighth annual meeting in Atlantic City, April 26-29, took a number of important steps to increase production. The meeting was termed an "increased production convention" and every subject taken up was approached from the viewpoint of stimulation of industrial output. Joseph H. Defrees, of Defrees ,Buckingham and Eaton, Chicago, was elected president of the chamber. Among the resolutions passed was one on increased production in which it was declared that "the country's problems can be solved more largely through increase in the country's production to restore proper relations between supply and demand than through any other measure. The results of the country's activities in every field of industry and distribution, and in the services which facilitate industry and distribution, must be increased in order that the diversions and the losses by reason of war conditions may be made good, and growing demands may be met. All obstacles to enlargement in the country's output of the manifold products and services entering into modern life must be removed, new incentives must be provided, and the sustained endeavors of all our people enlisted in a purpose that is the embodiment of patriotism in a period of adjustment from a great war to the bases of stability upon which our national welfare and our national prosperity will proceed.

"In aid of increased production, and to enhance its benefits, economy must become a cardinal principle with all

Preheat Boiler Feed Water

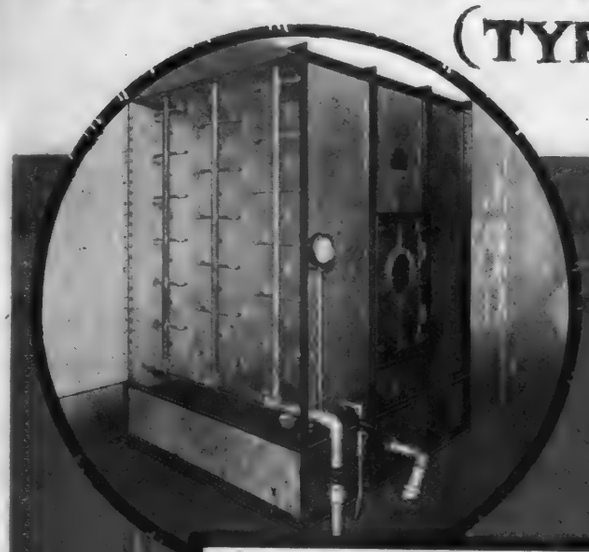
1. **TO INCREASE THE *ECONOMY* OF THE BOILER.**
   The Whitlock Feed Water Heater saves 13% of the coal burned under the boiler.
2. **TO INCREASE THE *CAPACITY* OF THE BOILER.**
   The boiler gains 13% capacity when used with a Whitlock Feed Water Heater.
3. **TO INCREASE THE *LIFE* OF THE BOILER.**
   Where a Whitlock Heater is used, there are no "local strains."

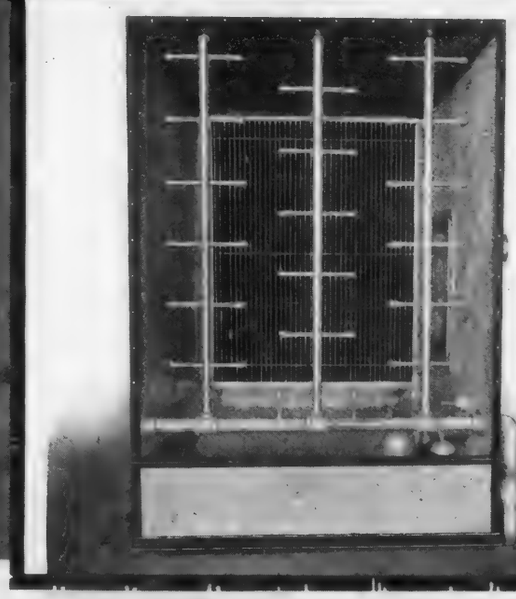
Bulletins on Request

THE WHITLOCK COIL PIPE COMPANY, Hartford, Conn.

"Whitlock Heaters Have Everlasting Copper Tubes"

SPRACO
AIR WASHERS
(TYPE "C")





The Nozzle Determines the Efficiency of Your Air Washer

COMPLETE ATOMIZATION IS ESSENTIAL to the efficient operation of your air washer.

Such complete atomization as is necessary depends purely on correct design and accurate construction of the nozzle.

In the SPRACO NOZZLE, the rotating spray which is developed by the turbine blades is struck by the hard driving CENTER JET, (no other nozzle has it) resulting in a dense, solid cone of completely atomized spray.

Write for Bulletin on "Type C" SPRACO AIR WASHER.

Spray Engineering Company
Boston, Mass.

Mfgrs. also of Spraco Cooling Ponds, Spraco Paint Guns and Cement Guns, Spraco Nozzles, Vaughan Flow Meters, etc.

THE·CENTER·JET·NOZZLE
Highest Efficiency by Test

of our public authorities,—federal, state, and local,—and must be practised by every citizen. General extravagance has followed every great human catastrophe, and its cure is a condition to the national progress upon which the personal interests of all Americans are dependent. The certainty of that future should enable every citizen to perceive the advantages which will accrue to him from present frugality."

Van H. Manning, director of the Bureau of Mines, Department of the Interior, has resigned to accept the position of director of research with the recently-organized American Petroleum Institute, the most important body of petroleum men in the country. His resignation was effective June 1. In his letter of resignation he took occasion to state that "in leaving the Government service there comes to me, as it has over and over again, the thought that although this Government spends each year many millions of dollars in useful scientific work for the benefit of the whole people, the monetary recognition of its scientific and technical servants is not sufficient to enable them to continue in the service for the people. This has been specially true within the past two years when it has been impossible for many men to remain in the Government service. With the marvelous expansion of the industry in this country and the growing necessity of science to industry, the scientific bureaus have been utterly unable to hold their assistants against the competition of industry which is taking their highly-trained men at salaries the Government does not pay or even approach." The new director of the Bureau of Mines is Dr. Frederick G. Cottrell, who was assistant director of the bureau under Dr. Manning. Dr. Cottrell is the originator of the Cottrell process for the electrical precipitation of fume and fine particles suspended in the gases of smelter, blast furnace or cement works flues. This invention was first utilized at the Selby smelter in California for removing fumes from the waste gases of a sulphuric acid plant at the smelter, thereby abating a nuisance that threatened to necessitate shutting down the works. Subsequently this process was installed at other smelters to remove fume and solid particles contained in the escaping gases, and it was also successfully used at cement plants, to prevent the dust from the calcining kilns from damaging nearby orange groves and vegetation.

Chicago.—An ordinance has been adopted by the City Council of Chicago changing the height limit of buildings from 200 ft., which has been the limit for the last nine years, to 260 ft., thus permitting the erection of 20-story buildings. An effort was made without success by the Public Affairs Commitee of the Western Society of Engineers to have the council adopt this regulation only as part of a comprehensive zoning plan for the city. It was maintained, for instance, that the proper height of buildings in any zone depends upon the character of the improvements in each zone, and upon the width of the adjacent streets. It was also argued that the adopted heights might in certain locations and for certain uses properly exceed the limits contained in the ordinance.

Manufacturers' Notes.

Chicago Pump Co., Chicago, Ill., manufacturer of electric pumping machinery, has moved its main offices to its new factory at 2322-2336 Wolfram Street, Chicago.

Curtis & Curtis Co., Bridgeport, Conn., manufacturer of pipe-threading and cutting machinery, has increased its capital stock from $200,000 to $1,200,000.

Sprague Electric Works of General Electric Co., New York, announces a new line of conduit supplies, including boxes and covers. The company has

Pat'd May 26, 1908

CYCLOIDAL MULTIVANE FANS

FULFILL THE ENGINEERS' OBLIGATION TO THE USERS

EFFICIENT — NOISELESS — DURABLE

Built along scientific lines—of high grade materials and best of workmanship. This coupled with our forty years experience in the manufacture of fans of all types—GUARANTEES

PERFECT SATISFACTION

SECTIONAL CATALOG NO. 120 CONTAINS CAPACITY TABLES, DIMENSIONS AND FURTHER DETAILS

Garden City Fan Co.
Est. 1879
CHICAGO, ILL.

THE MARK OF HIGH EFFICIENCY
Cycloidal

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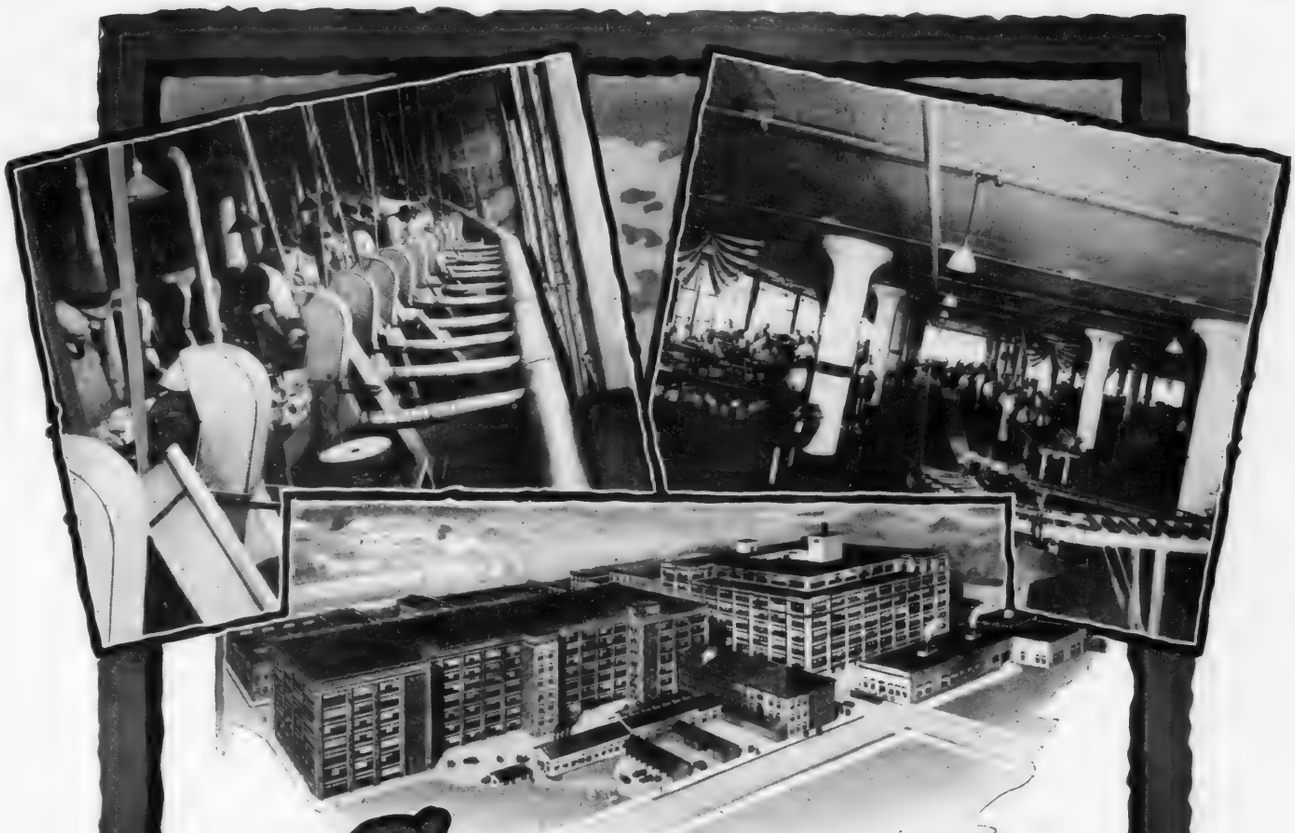


"Sirocco"

TRADE MARK

In Industrial Plants

There is only one best method for the new industrial plant. That is a proper system of ventilation which insures pure, clear air to all departments during every working hour.

At the Delco Plant, Dayton, Ohio, two systems are in use. In one department Sirocco Exhaust Fans are used to carry away dust from the buffing wheels. In another department Sirocco Fans furnish clear, fresh air, keeping the department in just the right condition for best results. Today greater attention is being given the ventilating question than ever before.

If you are working on a particular problem in which Sirocco equipment is being considered, one of our sales engineers, located near you, will be glad to talk over the proposition with you.

AMERICAN BLOWER COMPANY
Detroit, Michigan

adopted the trade name of Sprague-lets for some of its products. Its new plant at Maspeth, L. I., has greatly increased the company's manufacturing facilities.

Tuttle & Bailey Mfg. Co., New York, manufacturer of registers, grilles, etc., has moved its offices and show rooms to 2 West 45th Street, New York.

Haynes Selling Co., Philadelphia, has opened a branch office in Denver, Colo., in charge of J. H. Dale.

Greenfield Tap & Die Corporation, Greenfield, Mass., announces a stock dividend of 50%.

Shur-Tite Mfg. Co., Cleveland, O., manufacturer of the Shur-Tite boiler, pipe and radiator cement, has increased its capital stock and will add a new pipe joint paste to its products.

Burnham Boiler Corporation, Irvington, N. Y., has moved its Chicago office to the Insurance Exchange Building, 175 West Jackson Boulevard. J. M. Chattan, Jr., is manager.

Peerless Unit Ventilation Co., New York, has increased its capital stock from $25,000 to $100,000.

Precision Scientific Co., Chicago, announces that it has purchased the patents and right to manufacture the Sargent automatic gas calorimeter and accessories and has taken over the laboratory metal ware and speciality departments of the Sargent Steam Meter Company. These departments will be continued under the same management as heretofore. The company has now taken possession of its new two-story building at 820-822 South Tripp Avenue, Chicago.

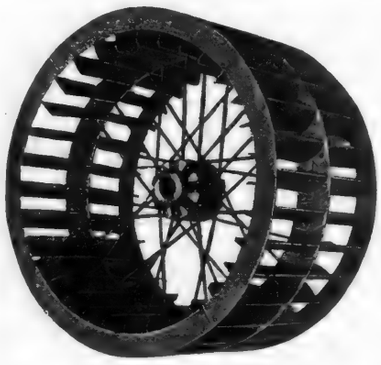
Atmospheric Conditioning Corporation, Philadelphia, Pa., announces the appointment of Benjamin Nelson as the company's western manager, with headquarters at 1301 Monadnock Block, Chicago. Mr. Nelson is a graduate engineer, University of Illinois, and was associated with the company for several years in a sales engineering capacity prior to the company's incorporation as the Atmospheric Conditioning Corporation. He was formerly connected with the Chicago office of Warren Webster & Company. He was with the colors during the war. In connection with his other activities Mr. Nelson is secretary of the Illinois Chapter of the heating engineers' society.

Jenkins Bros., New York, has increased its capital stock from $750,000 to $5,000,000.

Kennedy Valve Mfg. Co., Elmira, N. Y., announces the appointment of C. H. Kennedy, formerly district manager, as general sales manager, with headquarters in Elmira. The new manager for the New York district is John S. Hanlon, formerly Boston representative. George W. Waters, formerly in the sales department of the New York office, has been made Boston manager. A new sales office has been opened in Kansas City, at 208 Mutual Building, with F. N. Decker in charge. Mr. Decker was for many years connected with the plant in Elmira.

Central Station Heating Notes.

Belvidere, Ill.—A movement to build a new central heating system in Belvidere, to take the place of the one that was operated by the Northern Utilities Company, has been started by a number of citizens of that place. An organization has been effected to carry through the project and numerous stock subscriptions have been secured from prospective local users. As it would be impossible to complete a new plant in time for the opening of the heating season next fall, a proposition has been made to the Northern Utilities Company to take over the present system for at least a part of next season. In reply the company expressed its willingness to enter into negotiations for the leasing or selling of its system to Belvidere interests. Some time ago the Northern Utilities Company announced its intention to close down the heating system in Belvidere on June 1 of this year. It is of the water heating type. E. E. Dillon, a consulting engineer, of Madison, Wis., has been active in promoting the new project. His plan, as submitted, was that those now using the central



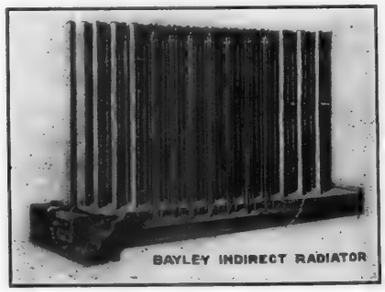
Air Engineering That Really Means Something

Bayley engineers specialize on the intricate problems of ventilating, drying and indirect heating. Bayley systems make good on the job because each installation is especially planned for the building for which it is intended. You can recommend the Bayley equipment with the assurance that its performance will be *right*.

Bayley

Plexiform Fan

For furnishing air at low velocity with either low or medium pressure. Requires only a small amount of housing and very little power; operates equally well with single or double width fan blades. Tangentially arranged spokes provide great strength without excessive weight. Hundreds of users will tell you that the Plexiform is wonderfully efficient.



Bayley Chinook Heaters

Uses either live or exhaust steam and furnishes even warmth throughout a shop. The circulation of steam is rapid and positive, and every square foot is prime heating surface. No unequal expansion or contraction to shorten the life of this heater. The Chinook can be used as a cooling system in summer by running cold water through the pipes.

Bring your problem to the Bayley engineers
Or write for the Bayley Bulletins

BAYLEY MANUFACTURING CO.
732 Greenbush St. Milwaukee, Wis.

Carrier Equipped

Schenley High School

Pittsburgh's most beautiful high school building is Carrier Equipped.

Every particle of air that enters this building is washed—freed from germ laden, disease breeding dust.

This pure fresh air is then warmed to the proper temperature and enters each room at just the right temperature and humidity.

In the gymnasium a cool dry atmosphere is maintained.

The room containing the swimming pool, on the other hand, requires a warm moist air, and this is made possible only with a Carrier Washer.

The class rooms and auditorium are kept at just the right temperature and the desert atmosphere common in many schools is entirely eliminated.

This ever-changing supply of clean fresh air means healthier students, better work and a cleaner building.

Let our Engineering Department assist you on your next school, office building or hospital job.

Our data is at your disposal.

Write Dept. 36 for catalog and data.

Carrier Air Conditioning Company of America

Buffalo, New York

Buffalo

heating service in Belvidere, should subscribe to the new company's capital stock, an amount equal to that which would have covered the installation of a private plant in their buildings. It was figured that such a system, taking care of the business district south of the river and the residence district for a block or two surrounding the business district, would cost about $60,000. The question of the boiler plant has not yet been taken up in detail, but the plan will be considered of using waste heat from the present electric lighting plant. A special committee of citizens visited Waterloo, Wis., where a municipally-owned and operated system is in use and came back highly enthusiastic over the proposition.

Seattle, Wash.—A proposed ordinance has been prepared by Thomas J. L. Kennedy, assistant corporation counsel, and presented to the city council which, it is stated, is directed against the Puget Sound Light & Power Company. The proposed ordinance is an answer to the charge that the company is using its monopoly of steam heat to coerce downtown business firms to use exclusively heat and power furnished by the company. It is provided that companies furnishing steam heat must make all contracts public. Provisions are included against rebates, unreasonable preferences and unjust discrimination. The council is given authority to determine rates and regulations. Penalties for violations are placed at $100.00 and 30 days in jail.

Duluth, Minn.—The question of financing the new municipal heating system is proving a knotty problem for the city. The question up for settlement is whether to issue bonds to meet the sum of $333,000 taken from the general fund or to continue the assessment system. The system was built on the general assessment plan and sentiment is divided over continuing that method or having a bond issue. Bond issue advocates contend that the entire investment can be returned to the general fund immediately by following that course, and heating service rates could be set at a figure which would make possible retiring the issue with the profits earned, meaning that the consumers of the heat would really pay all the cost of the system. It is also pointed out that a bond issue would eliminate the possibilities of any court action. On the other side of the question, it is contended that the system was installed on contracts calling for payment by assessment and before a new plan of payment can be put into operation, every subscriber must be induced to agree to the change. It is feared that rates might be forced to the point where subscribers would cut off the service, thus leaving a bond issue for the entire city to pay. Opponents of the assessment plan claim that the charges at present are not fair and should be more nearly equalized.

Norristown Steam Heat Co., Norristown, Pa., after a career of eighteen years, has announced that it has discontinued operating, due to its inability to render service at present-day rates.

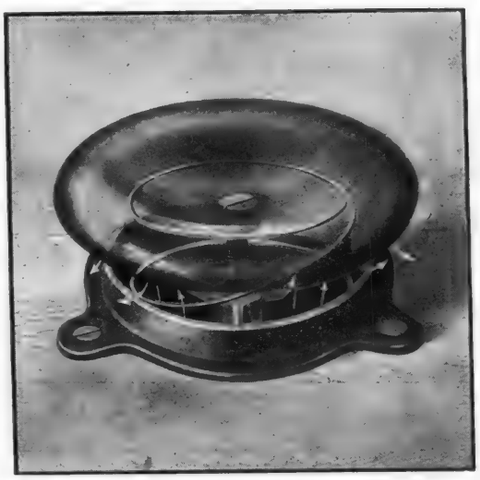
New Firms and Business Changes.

HSBW-Cochrane Corporation, Philadelphia, Pa., is the new title of the Harrison Safety Boiler Works of that city. The company has been established since 1863, its principal products being Cochrane open feed-water heaters, steam-stack and cut-out valve heater and receiver, V-notch metering heaters, hot process water softeners and multiport back-pressure valves.

Ford Regulator Corporation, New York, has been organized to take over the business of the Thos. P. Ford Company. A middle west branch at 1830 Lytton Building, Chicago, Ill., under the management of Ewart H. Bolton, who has successfully marketed Ford valve specialties for the past four years, will be included in the parent organization. The officers are: President, Thomas B. Ford; vice-president, Ewart H. Bolton; treasurer, Henry Dusenbury; secretary, Toney A. Hardy.

Richardson & Gay, Boston, Mass., is the title of a new firm of consult-

Lehigh Mushroom Ventilators



Saving in Cost
Economy in Installation
Ease in Adjustments
Efficiency in Operation

HERSH & BROTHER

MANUFACTURERS OF
FANS, AIR WASHERS AND VENTILATING EQUIPMENT
ALLENTOWN, PA.

DATA BOOK: Write for your copy of our new data book on fan engineering

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

CAPITOL THEATRE NEW YORK

IN this the most modern and up-to-date and perhaps the finest theatre of its kind in the world,

Massachusetts Fans

were selected to take care of the fresh air supply and exhaust systems. Seven large "Squirrel Cage" fans and two Massachusetts Davidson propeller fans were installed, the four main fans supplying and exhausting respectively 140,000 cubic feet of air per minute, while the smaller fans exhaust 20,000 cubic feet of air per minute from the lavatories, smoking room, etc. One hundred horse power is required to operate the plant.

Where may we send you ALL the facts on MASSACHUSETTS FANS?

MASSACHUSETTS BLOWER CO.
WATERTOWN, MASS.

ing engineers, composed of Edward B. Richardson, and Harry Gay. Mr. Richardson was formerly of Richardson & Hale, consulting engineers. During the war he went overseas with the 26th Division and was discharged from the army in 1919 as lieutenant-colonel, Field Artillery. Mr. Gay for the past nine years has been in the Boston office of Stone & Webster, Division of Construction and Engineering. The new firm has taken quarters at 220 Devonshire Street, and will cover all branches of steam engineering work, including heating, ventilating, air conditioning, as well as in supervising supervisions, reports, appraisals, etc.

Tarpenning-LaFollette Co., Indianapolis, Ind., has been formed to take over the business of Charles T. Tarpenning of that city. The company will specialize in the design and installaton of fan and blower systems ventilating, heating, cooling and drying, as well as dust handling and industrial work. The company's quarters are at 301-305 Virginia Avenue. Mr. Tarpenning has had over 30 years' experience as a practical sheet metal worker and as mechanic, designer, shop superintendent and contractor. Mr. LaFollette has had nine years' experience as sales engineer, sales manager, or chief engineer, with the American Blower Company, and the Clarage Fan Company. He is a member of the American Society of Heating and Ventilating Engineers.

Olney Plumbing & Heating Co., Olney, Ill., composed of Constantine Clark, Bascom French and Edward Sparr, has purchased the heating, plumbing and metal work business of the Horrall's Private Utilities Company, owned by Walter L. Horrall. The new company will continue the business at the present location.

New Incorporations.

Premier Warm Air Heater Co., Dowagiac, Mich., capital $300,000, has been organized to manufacture the Premier warm air heater. The company is building a new factory building of concrete, brick and steel fireproof construction on the main line of the Michigan Central Railroad. It will be built in units, each being 120 x 360 ft. President, William F. Judd; vice-president and general manager, Harry L. Wood; superintendent, Ralph S. McNancy. secretary, C. C. Sinclair, treasurer, Richard M. Judd.

Narragansett Boiler Works, Providence, R. I., organized to manufacture boilers and boiler equipment. Benjamin A. Lowe, 38 Payton St., Providence, is at the head of the company.

Contracts Awarded.

Ryan Plumbing & Heating Co., Davenport, Ia., heating and plumbing F. W. Woolworth Company office building at Watertown, N. Y., an 8-story structure, for $100,000; also St. Mary's Church in Benton Harbor, N. Y., for $60,000.

W. B. Guimarin, Columbia, S. C., heating State Capitol building for $34,480. Other bidders were: Waldrop Co., Rock Hill; Central of Georgia Heating Plant Co., Charleston; A. Denmont, Durham, N. C.; and B. McKensie, Greensboro, N. C.

Waterloo, Ia.—Bids were received as follows for the general contract, heating, plumbing and electrical work for the new high school building in Waterloo:

GENERAL CONTRACT.

Fleischer Construction Co. Minneapolis	$749,000
H. A Maine Co., Waterloo	775,000
Gehard Building Co., St. Louis, Mo.	800,000
Currie-Simpson Co., Waterloo	844,000
John G. Miller, Waterloo	849,950
W. F. Kuchara, Des Moines	870,980
Drummond-Miller Co., Cleveland, O.	894,900

HEATING CONTRACT.

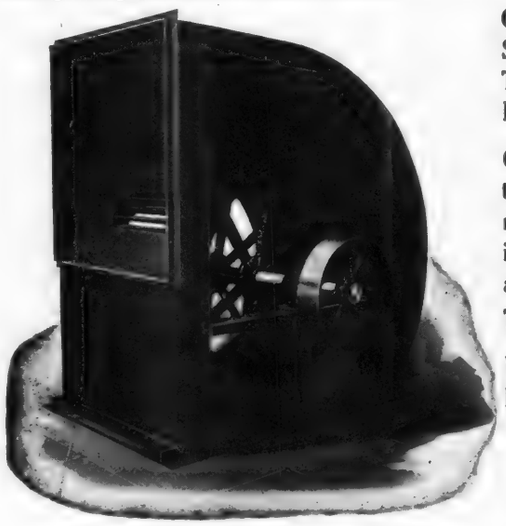
H. Kelley & Co., Minneapolis	152,975
M. J. O'Neil, St. Paul	153,420
Carsten Bros., Ackley, Ia.	158,884
Peter Eichler Co., St. Louis.	158,970
Sodemann Co., St. Louis, Mo.	160,000
Modern Heating Co., St. Louis	172,400
F. E. Newberry Electrical Co.,	196,000

PLUMBING CONTRACT.

M. J. O'Neil, St. Paul	38,770
H. Kelly & Co., Minneapolis	40,970
Carstens Bros., Ackley, Ia.	158,884

Buckeye Multiblade Fans

are made especially for low pressure Heating and Ventilating work. They are giving perfect satisfaction.



CORRECT DESIGN. HEAVY CONSTRUCTION, NOISELESS OPERATION, WORKMANLIKE FINISH, HIGHEST EFFICIENCY.

Our Engineering Department is maintained for the purpose of assisting Engineers, Architects, etc., in planning efficient Heating and Ventilating Systems for all buildings.

THIS DEPARTMENT IS FREE TO YOU.

We also manufacture a complete line of Disc, Cone and Steel Plate Fans.

Write Department D

BUCKEYE BLOWER CO.

COLUMBUS OHIO.

Hotel Ambassador—

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WESTINGHOUSE ELECTRIC

To be
New York's Finest Hotel
WILL BE EQUIPPED WITH

WESTINGHOUSE ELECTRICAL APPARATUS

including turbines, generators, switchboards, safety lighting panels, motors for ventilating fans, pumps, air compressors and other equipment.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.

Sales Offices in all Large American Cities

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Contractors

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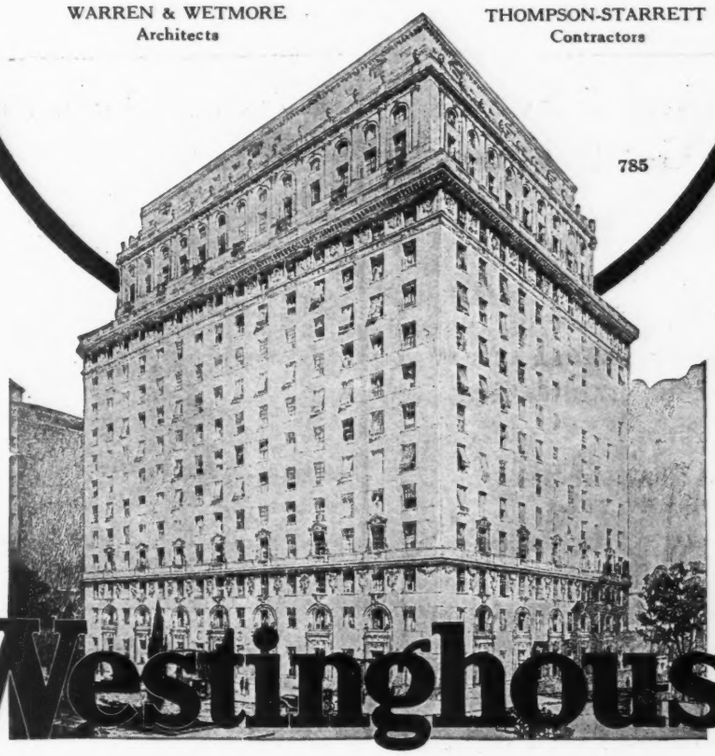

Westinghouse

ELECTRICAL CONTRACT.

Carstens Bros., Ackley, Ia....	19,984
Electric Construction Co., St. Paul	21,580
F. E. Newberry Electrical Co. St. Louis	23,250

With the lowest bids making the cost of the completed building over $300,000 more than the amount of bonds voted for the purpose, the structure as planned can be built only by calling another election for the purpose of authorizing an immediate tax levy or increased bond issue, to make up the difference. The alternative is to adopt a partial building plan and ask for a corresponding reduction in the amounts of the bids, to come within the $600,000 limit of the bond issue.

No Steam Pipes in Russia.

Six years of ceaseless war, with sharp winters untempered by heated houses, leave Russia this spring practically a land of ruins so far as heating pipes and other steam and plumbing fittings are concerned.

Steam heating and modern plumbing, even in the wealthier households in Russia, are comparatively fresh ideas. Only the progressively inclined members of the aristocracy who had travelled in western Europe, and some men of the industrial classes affected central heating and up-to-date bathtubs. So the hurricane of war and several coal-less winters have swept away the tender growth of steam heating outfitter's and plumber's art in this land of ice and snow.

On coming to South Russia, the American Red Cross Commission lived for a short time aboard the ship which brought the commission and its $2,000,000 worth of Red Cross supplies to Novorossisk. Later, however, a house for the personnel had to be found in Ekaterinodar, where headquarters were established. The building chosen for the commission had once been fitted out with water heating and service pipes, but on inspection all were found burst by the intense cold of the preceding winter. So the old fireplace, which had become merely ornamental since the installation of modern heating appliances, was again put to use. But it heated only the ex-drawing room, leaving the offices and bedrooms in the grip of the bitter cold. Smoky braziers of the well-known army type were improvised, with the equally well-known disadvantage of having the smoke remain inside while the heat escaped through the opened windows.

WOOD MARKET AT PODGORITZA, SOUTH RUSSIA.

Most of the public institutions also suffered acutely from burst water pipes during last winter. Officials in the government bureaus could be seen working at their desks with their legs wrapped up in overcoats, drinking hot tea in quantities startling to the tea-fiend Russians themselves.

If a big American freighter loaded

If You have not a Set of Our Catalogs, Get It Today

Steam, Vacuum, Compound, Altitude, etc.

Thermometers for all applications

It is more than a catalog—it is a text book on Instruments for Indicating and Reading Pressure, Vacuum Draft, Temperature, etc.

Write for Special Catalog Set HV, Today

The Schaeffer & Budenberg Mfg. Co.
BROOKLYN, N. Y.

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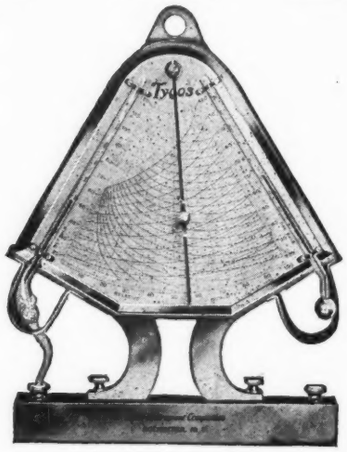
Also many other Allied Instruments, Gauge Boards and Complete Equipment

Tycos Temperature Instruments

Indicating Recording Controlling



Get Tycos Records

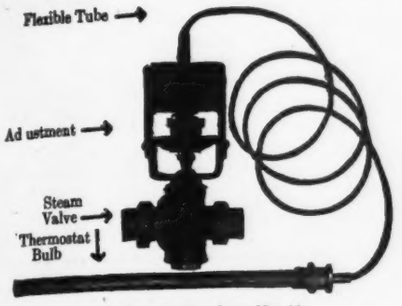
Where humidifying is required, accurate humidity records are a necessity and here is where the Tycos Recording Hygrometer qualifies.

Ask the Tycos staff of thermal engineers to consult with you on your humidity and temperature problems. No obligation is implied in your request for this.

Taylor Instrument Companies
Rochester, N. Y.

There is a Tycos and Taylor Thermometer for every purpose

TEMPERATURE CONTROLLING APPARATUS

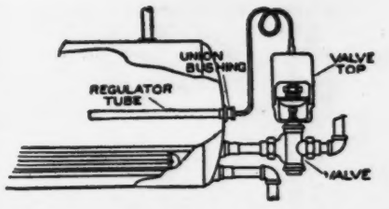


The Powers Regulator No. 11

Hot Water Control

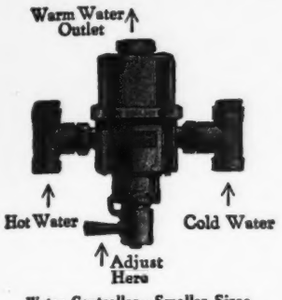
The Powers No. 11 Automatic Thermostatic Regulator is an absolutely reliable regulator for steam heated hot water service. It is an accurate regulator of the self-contained type, used for the control of liquid temperatures, and has a great variety of applications. Water Cooling, Water Heating, Steam Cookers, Pasteurizers, Hot Water Tanks, Water Cooling Tanks, Feed Water Heaters, etc., are all made automatic by its use.

For further details, prices, etc., ask for Bulletins 129 and 138.



Typical Installation of No. 11 Regulator on Steam Heated Hot Water Service Tank. Installation expense is practically nothing.

Shower Bath and Hot Water Line Control



Water Controller—Smaller Sizes
Full nickel finish

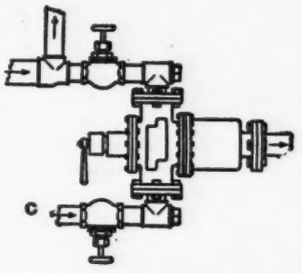
The Powers Thermostatic Water Controllers are true thermostatic mixers, and should not in any way be compared with the numerous mechanical mixers and so-called anti-scald valves on the market.

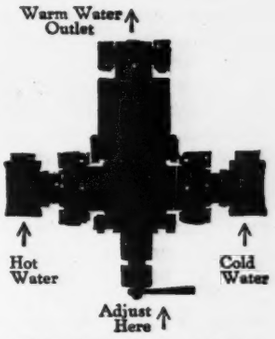
The Powers Water Controllers are the last word in safety and economy. Over heated water cannot pass through them. If either hot or cold water fails, the entire flow is automatically shut off.

FOR SHOWER BATHS, single or in gangs, these controllers assure the delivery of water at the desired temperature. Adjustment is simple; at the pleasure of the bather, or fixed and locked as circumstances dictate.

Ask for Bulletin 124, giving further details and prices.

For the hot water line, a Powers Water Controller properly installed prevents extremely hot water from going to the bath room, thus saving wear and tear on the fixtures, but permits the kitchen and laundry to take it as hot as may be desired. Drawing at right illustrates this.

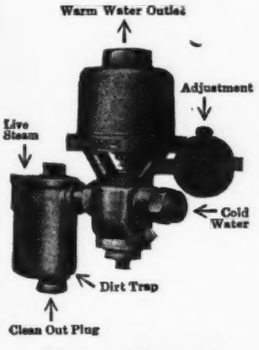




Water Controller—Larger Sizes
Black enamel or aluminum finish

Hot water entering at A passes at its original temperature, through B to Kitchen and Laundry, also entering mixer, where it thermostatically combines with cold water which enters at C and is discharged to Bath Room line D at desired temperature.

Thermostatic Water Heater



The Powers Thermostatic Water Heater

A safe, sure and accurate method of heating water with high pressure steam. Thermostatically controlled. Adapted to workmen's wash sinks, shower baths, etc., in factories, mines and other industrial plants, and to a great variety of purposes where a supply of warm or hot water of a specified temperature is desired at irregular intervals.

Absolutely safe against scalding.

Ask for Bulletin 137.

High Pressure Steam Trap

This is a small, compact and extremely efficient trap suited to apparatus using high pressure steam for its heating properties.

Absolutely positive in its operation, discharging freely a large volume of water, but closing tight against steam. Constructed on the vapor disc principle.

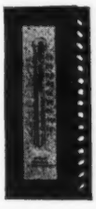
Suitable for use on Sterilizers, Dryers, Steam Kettles, Steam Tables, etc.

Will automatically pass water of condensation but close against steam, insuring greatest economy in steam consumption.

Ask for Bulletins 115 and 122.

Powers High Pressure Steam Trap

Control of Temperature in Living Rooms



Thermostat

Industrial establishments are fast awakening to the fact that automatic control of temperature in offices and shops is a necessity if production is to be maintained at the maximum. Overheated rooms mean a slowing up of workers, a menace to health and a waste of fuel and labor. Rooms insufficiently heated mean less work accomplished because of clumsiness of cold fingers; more accidents, sub-standard results and wasted materials.

The Powers System of Temperature Regulation is noted for its great accuracy and durability. May be installed in old or new buildings, for all, or any portion of the rooms.

The thermostat illustrated is typical of the Powers System. Wherever you see one, you may be assured that the system *works*.

Another feature of the Powers System is the All-Metal Radiator Valve—famous as the "Last-forever" Valve.

Ask for catalog "D" for further particulars.

"Last-forever" Valve

THE POWERS REGULATOR COMPANY

Specialists in Automatic Heat Control

954 Architects Bldg., New York
2718 Greenview Ave., Chicago
365 The Federal Street Bldg., Boston
The Canadian Powers Regulator Co., Ltd., Toronto, Ont.

(1275)

with heating and plumbing supplies should one day steam into some Black Sea port, government officials, manufacturers, Red Crossers, pipe fitters, and business men would swarm on the docks, eager to get first chance at the vendor of these much-needed materials.

Summer Course in Management at Pennsylvania State College.

A two weeks' summer course in Industrial Organization and Management is announced by the Pennsylvania State College, to run from August 9 to August 21. This will be the fifth consecutive year of this course. It is designed to meet the needs of manufacturers, superintendents, employment directors, foremen, accountants, and all others who pilot the daily affairs of industry and who are willing to devote two weeks to intensive study. The work is divided into discussions on factory organization. manufacturing methods, employment. industrial betterment, planning and production control, purchasing, coat accounting and kindred subjects. The greater portion of the time will be devoted to practical installation of methods, using the equipment of the college which is especially designed to handle this type of work. A four-year course in Industrial Engineering has been carried on for the past twelve years at the college.

YOUR LIBERTY BOND

The United States Government borrowed money from you to finance the war. You hold the Government's promise to pay you back in the form of a Liberty Bond or Victory Note. On this bond is stated the conditions under which the Government borrowed the money from you.

If, for instance, you hold a bond of the Third Liberty Loan, it states that on April 15 and October 15 of each year until maturity, you will receive interest on the amount you paid for the bond. Other issues bear other rates of interest and other maturity dates, all of which are clearly stated on the bond.

If you keep your bond until the date when the Government pays you in full for it, you do not need to worry if, in the meantime, the price is low one day or high the next. You and Uncle Sam are living up to your agreement with each other, and neither will lose by it.

On the other hand, if you sell your Liberty Bond now, you will find that the man you sell it to will not give you a dollar for every dollar you paid for it. The price has been brought down because so many people are offering to sell their bonds. If the market is flooded with tomatoes, you can buy them cheap, but if everyone is clamoring for tomatoes and there are few to be had, the price goes up. The same is true of Liberty Bonds. Short-sighted people are dumping them on the market, and wise ones are buying them.

Buy as many more at the present low rate as you can afford. If you hold them to maturity, you are bound to make the difference between what they sell at now and their face value. You will also receive good interest on your investment. WILLIAM MATHER LEWIS, *Director Savings Division, War Loan Organization, Treasury Department.*

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisements contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

Manufacturer's Agent—English Canadian knowing the French language thoroughly, with established headquarters in Montreal, desires to handle heating, plumbing, ventilating, electrical lines, vacuum cleaning and farm-lighting systems, etc., as manufacturers' agent for American firms. Controls trade in Canada east of Toronto, Address Canada, care of Heating and Ventilating Magazine.

Wanted—Heating draftsman, with three to five years' experience. Splendid opportunity for advancement. Give full particulars in first letter. Address Sherman, care of Heating and Ventilating Magazine.

DRAFTSMAN—Familiar with heating and ventilating work. Stating full experience, reference and salary desired. Meyer, Strong & Jones, Inc., 101 Park Avenue, New York.

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RE-ENFORCED
PACKLESS
VALVES

Quick Opening

Note General Lines Carefully

The **ONLY Packless** and **Modulated** Valves in which the **Packless Feature,** although a **positive seal within itself** and **practically indestructible,** is, through a packing cushion and a very heavy special spring, **automatically re-enforced,** providing **two** or **double, independent, positive,** bonnet seals at **all times.**

These valves will withstand high pressures and, therefore, are of **superior value** for **vacuum** and **low pressure service.**

We specialize on high grade Radiator Valves and furnish the largest line of any company in the business

Printed matter and prices on application

MARSH VALVE CO., Erie, Pa.

STATE LAWS AND MUNICIPAL REGULATORS
require that all public buildings be uniformly heated

Cleveland Electric Thermometers

accurately indicate or record the temperatures of the various rooms, outside atmosphere, etc., at a central point in the boiler room, custodian's office or wherever desired. The use of a CLEVELAND PYROMETER installation in addition to adding to the comfort of the occupants will aid the engineer or fireman in reducing the fuel bills.

THE CLEVELAND INSTRUMENT CO.
Electrical Measuring and Recording Instruments
CLEVELAND, OHIO

New York Repres.
Herman H. Sticht & Co.

Buffalo Office
43 South Division St.

PECO

The Fool-Proof Valve

"The System with a Record"

Over thirty plants
"Pecoized" for one company

20% to 40% fuel saving

Let us talk over your condition with you

Non-adjustable
Positive in action

Catolog on request

PITTSBURGH ENGINEERING CO.
Mfrs. Peco Vacuum System of Steam Heating and Drying
House Building **PITTSBURGH, PA.**